

California Native Plant Society

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September 25, 2017

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By email to: CCAP@sdcounty.ca.gov

Re: County of San Diego Climate Action Plan (PDS2015-POD-15-002), General Plan Amendment (PDS2016-GPA-16-007), Draft SEIR (LOG NO. PDS2016-ER-16-00-003).

Dear Ms. Soffel,

Thank you for the opportunity to comment on the draft of the County of San Diego ("County") Climate Action Plan ("CCAP") and associated draft subsequent EIR ("SEIR"). CNPS promotes sound plant science as the backbone of effective natural areas protection. We work closely with decision-makers, scientists, and local planners to advocate for well informed and environmentally friendly policies, regulations, and land management practices. Our focus is on California's native plants, the vegetation they form, and climate change as it affects both.

In this letter, I am commented both on behalf of CNPS on plant and climate change issues, and as a homeowner and author who roughly a year ago bought a new house with the express intent of decarbonizing it by installing solar panels on its large, south-facing roof, replacing all appliances and utilities with electrical systems, and ultimately purchasing storage batteries and electric vehicles. As an author, in 2015 I published *Hot Earth Dreams: What if severe climate change happens and humans survive?* so I have some small expertise on the subject of climate change. Because I am combining these two comment streams, when I use "we" I am speaking on behalf of CNPS, while "I" speak only for myself.

In general, we are pleased that the County has rewritten the CCAP and want it to be successful. Still, there are many things that need to be clarified, changed, and added to make it work, as detailed below.

Comments From A Decarbonizing Homeowner

Obviously the County has greater resources than I do, but I was unhappily surprised in reading the CCAP to find simple observations missing. **If projects can tier off the CCAP SEIR to streamline their review, how are County Planners expected to detect deceptions?** This is where my simple experience as a homeowner might come in handy.

My wife and I bought our current house a year ago, and we chose it explicitly because it had a large, south-facing roof that was good for solar panels. Our plan was to put a large array



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factor. Anyone looking at proposed street map for that development (which sits in a steep-walled, north-south running valley) would see that most lots were at best suboptimally angled to produce a lot of solar power, and to make the mitigations work, each house would have to be custom built to catch the sun and not shade its neighbors. Still, the County accepted this document without asking the project proponent to produce numbers demonstrating that their proposed mitigation would work.

This is where simple numbers, like 4 miles driven per kWh, or 20 ft² of solar array producing 1 kWh/day, are useful. They are not precise, and all development proposals should have much more accurate figures. Still, if a project proposes to generate thousands of car miles travelled every day, and does not have tens of thousands of square feet of solar arrays dedicated solely to charging cars, it is necessary to ask where the developer expects the energy for the cars to come from, and to figure out how to mitigate those impacts as well.

Finally, a small point: why does the proposal to use natural gas in a new project not have to be justified automatically? As I am finding as a homeowner, every appliance and utility powered by natural gas has an electrical equivalent that is the same price or even cheaper. Yet natural gas pipes are still installed as a matter of course, even when as at Newland Sierra, they have substantial GHG impacts through both installation and subsequent leakages. As a homeowner, I will have to pay to replace all the gas appliances in my new home, remodel the kitchen around the new appliances, and pay to have the gas ultimately shut off. As San Diegans, we know that natural gas is at best a temporary convenience and at worst an extremely problematic greenhouse gas. We know someone will have to pay to have natural gas uninstalled sometime during my life, unless an earthquake does it for us. **Why even install natural gas now? Why not ask developers to justify the installation of natural gas or any other fossil fuel supply, rather than assuming it must happen as a matter of course?**

Climate Action Plan Comments

Chapter 2

First, one important omission is that San Diego County has quite a lot of sequestered carbon in its trees, shrubs, marsh and riparian sediments, and root systems, not to mention the wood in existing wooden structures. When these systems are destroyed, all of that carbon either goes back to the air, or enters the waste stream and thereby contributes to GHG emissions. Loss of existing stocks of sequestered carbon must be considered as part of any development in wildlands or redevelopment where substantial demolition is required. **What mechanisms can be developed to provide the County with a usable and continuously updated accounting of the carbon already sequestered in the County? What measures can be deployed to streamline accounting for impacts to this stock of carbon, and to merge it with accounting of carbon sequestered under the CCAP?**

Second, we are puzzled by the County's decision to use 2014 as the baseline year from which to calculate greenhouse gas ("GHG") emissions reductions. As we understand California AB 32, SB 32, EO B-30-15, and EO S-3-05, 1990 is supposed to be the benchmark year against which GHG emissions are measured. While San Diego County does not have emissions data from 1990, a 1990 GHG emissions inventory estimate for the San Diego County was created by the Energy Policy Initiative Center at the University of San Diego¹ in 2013. **Why was this**

¹ "San Diego County Updated Greenhouse Gas Inventory. <http://catcher.sandiego.edu/items/usdlaw/EPIC-GHG-2013.pdf>. Accessed September 21, 2017

*"UTP Projects must achieve GHG reductions or removals above and beyond any GHG reductions or removals that would result from compliance with any federal, state, or local law, statute, rule, regulation, or ordinance. Projects must also achieve GHG reductions and removals above and beyond any GHG reductions or removals that would result from compliance with any court order or other legally binding mandates. Deeded encumbrances, tree-planting and management ordinances, and contractual agreements, collectively referred to as Legal Agreements, may effectively control urban forest carbon and possess ownership rights to the carbon inventories controlled. Similarly, deeded encumbrances, tree planting and management ordinances, and contractual agreements may have an effect on urban forest carbon inventories beyond the control of any of the Urban Forest Owners. **Trees planted to fulfill a legal requirement are ineligible under this protocol. Legal requirements include any requirement issued by authority of a federal, state, or local jurisdiction to plant trees for any reason.**"*
[emphasis added]

We are not lawyers, but we believe Timber Harvest Plans are considered equivalent to EIRs, and the last sentence of the Urban Tree Planting Protocol seems definitive. Moreover, we know that the Cuyamaca Rancho State Park (CRSP) Reforestation Plan, the only CAR project in southern California, was run under three emergency CEQA exemptions, and State Parks repeatedly refused to put the project in their General Plan Update, despite the fact that it would last for 100 years and cover 25% of the CRSP. We never received a clear response from State Parks as to why they acted as they did, but to us, it appeared that they wanted to avoid involving CEQA in the CRSP Reforestation Project.

Also, we have not checked other CAR protocols or the protocols of other registries. We strongly recommend that the County does so.

At this point, we strongly advise consulting with CAR and all other climate registries considered for GHG-1 mitigation to determine if they are willing to work on projects mandated by the County to meet the CCAP. Which registries and similar entities are willing to help the County implement CCAP and projects that tier off of it?

Chapter 3

First, as noted in comments on Chapter 2, are the GHG targets for 2030 and 2050 consistent with state guidelines? If not, what can be done within the CCAP framework to meet state mandated targets?

We also have specific comments on Chapter 3.

First, we agree that a formal five-year review is a good idea. However, this should not preclude consideration and rapid adoption of more effective GHG reduction measures that become available between review periods. **Can this be written into the CCAP?**

Second, Table 3.1 and Figure 3.1 seem to indicate that there is a disproportionately low percentage of future GHG reductions in the transportation and built environment fused category. In terms of emissions, transportation and built environment accounts for 46% of annual GHG emissions, yet that category accounts for only 13% of GHG reductions by 2030. Obviously the County can't buy everyone an electric car, but as I noted above, this does shift the cost of decarbonizing onto households who have to buy new cars or move to be near new transportation corridors. **What can be done by the County to further decrease the amount of GHG emitted by the transportation sector?**

Third, acquiring open space does decrease GHG emissions, so long as the plants on that space are not burned, bulldozed, or cleared in the construction of unpermitted mountain bike

- **How will the County monitor the carbon sequestered in street trees? What plan does it have to update monitoring protocols while keeping data from past years comparable with new methods?** This was a problem with the data that CNPSSD obtained from the CRSP Reforestation Project through a CRA request: it was unclear whether monitoring reports could be accurately compared between years to understand trends in the project.
- Pests and pathogens, from gold-spotted oak borer to Kuroshio shothole borer to various phytophthoras, are serious and increasing problems for trees in general. The County can play a key role by helping to integrate the response between street tree maintenance and state Agriculture pathologists, by helping to link researchers and pest control workers with funding sources, and by helping the state to check and quarantine the large amounts of possibly infected/infested greenwaste that will come out of this effort. While composting should kill most (but not all!) pests and pathogens, the large system of greenwaste movement and storage (prior to composting) envisioned by Cal Recycle will become a pest and pathogen superhighway unless everyone involved, including San Diego County, becomes more sophisticated and more concerned about sanitation. **What can the County do to increase sanitation and help check the spread of plant pests and pathogens? How can this be folded into its investment in plants as carbon sequestration, as a necessary cost to insure the investment?**

Chapter 4

As author of *Hot Earth Dreams*, I want to discuss some of what might well happen if severe climate change happens. In that spirit, I will make a few points that might not be obvious.

Although the IPCC5 and most bureaucratic discussions of climate change end at 2100, it is a deadly mistake to think that climate change stops or even hits its worst in 2100. If we follow the RPC 8.5 emissions trajectory, climate will continue to change, with global temperatures peaking in 2300-2500, and sea levels peaking thousands of years after that (the kilometers-thick ice sheets in East Antarctica will melt slowly, due to their enormous thermal inertia). The global climate will then subside to what climate change critics label "the pleasant Miocene" over a few centuries after that peak. Thereafter, average global temperatures will slowly return to 20th Century norms over 100,000-400,000 years, after which there will be another ice age.⁴ Global peak temperatures are one of the two mass extinction drivers, the other being whatever Peak Humanity happens in the 21st Century (in terms of human numbers and land conversion). The climate may be livable as Earth cools back down, but getting there will be difficult.⁵ The point of the CCAP is to decrease the maximum temperatures we experience and shorten the time it takes to return to 20th Century normal climates. If we stopped emitting GHGs tomorrow, it would take a few hundred years for the climate to return to "normal." While we cannot cease emitting without a total nuclear war and probably not even then, there is an enormous gulf between a few hundred and a few hundred thousand years of impacts. By limiting our emissions, we can partially control how long the hot weather lasts.

⁴ Archer, David. 2010. *The Long Thaw: How Humans Are Changing the Next 100,000 Years of Earth's Climate*. Princeton University Press.

⁵ It is worth remembering that the weather extremes are more important than the average temperatures in determining what lives and what dies, so a warmer average climate means there will be more extreme weather events.

city powered entirely by electricity in a hotter, less predictable environment, where less resources are available per person, is a bigger challenge than growing a horse-powered town into an automobile metropolis, *simply because we won't have a massive supply of cheap fossil fuels to accomplish the change*. I think we can do make this worthwhile transformation, but I don't think it will be easy or simple. Simplifying ("streamlining") oversight on this process is unlikely to be a good idea.

There are also additional comments on Chapter 4 from CNPSSD.

First, preparing for increased wildfire risk requires the following actions to be taken by the County:

- not putting people in harm's way, by not allowing low density development in high fire areas and by insuring that there are roads enough to evacuate people (a serious problem with Lilac Hills Ranch).
- Promulgating Fire Safe landscaping guidelines that are put out by CalFire and others. These are readily available, yet the developers of Lilac Hills Ranch and many other leapfrog sprawl communities seem to never have heard of them.
- Promulgating fire safe building designs, with such simple features as the screened roof events that Supervisor Horn so disliked.
- Educating County residents *repeatedly* about how to minimize risks, as is done with everything from floods to earthquakes.

The point here is that simple changes can have enormous impacts. While it appears to infringe on people's rights to ask them to build safely, if we all are required to pay for the fire protection on their homes, and their bad design choices endanger their neighbors homes as well as their own, then they have to find ways to share the burden around and be responsible community members.

Chapter 5 Implementation and Monitoring

First, we are concerned with the statement that the County will use Measure T-4.1 (direct investments) to achieve equivalent reductions if a particular measure is not adopted by the Board of Supervisors. This appears to be an way to amend the CCAP on the fly. As noted above, there are legal issues that may need to be resolved before this method can work, and committing to it as a backstop is problematic. **What other measures can be taken in case a measure is not approved and off-sets cannot be purchased? Are other identified measures flexible enough to take up the slack in sequestration?**

Second, while it sounds reasonable to tier off the CCAP and streamline future projects whose greenhouse gas emissions are in line with the CCAP, there are two issues with this. First, as noted above, there may be a tendency to allow projects to "vague" their way into streamlining, as Newland Sierra may have done with their mitigation proposals. **How can the CCAP and SEIR be modified to explicitly require quantification of proposed mitigations, proposed reductions of GHGs, on-site electricity generation, and off-site credits? Second, what if the CCAP does not hit its proposed targets? Won't projects that attempt to tier off a non-compliant CCAP be considered to have significant impacts? What steps can be taken to resolve these issues?**

SEIR Comments

We found seven issues that we commented on. The first is that the SEIR will need to be revised to match any revisions in the CCAP, particularly in terms of direct investment and in

What combination of education, outreach, and regulation can the County employ to keep our adaptation to the 21st Century from turning the County into a dusty industrial development, enabled by the CCAP? Where are these impacts analyzed and mitigated?

Thank you for taking these comments. Please keep CNPSSD informed of all developments with the CCAP and associated documents and meetings, at conservation@cnpssd.org and franklandis03@yahoo.com.

Sincerely,

A handwritten signature in cursive script, appearing to read "Frank Landis".

Frank Landis, PhD
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1 Introduction

The Forest Project Protocol (FPP) provides requirements and guidance for quantifying the net climate benefits of activities that sequester carbon on forestland. The protocol provides project eligibility rules; methods to calculate a project's net effects on greenhouse gas (GHG) emissions and removals of CO₂ from the atmosphere ("removals"); procedures for assessing the risk that carbon sequestered by a project may be reversed (i.e., released back to the atmosphere); and approaches for long term project monitoring and reporting. The goal of this protocol is to ensure that the net GHG reductions and removals caused by a project are accounted for in a complete, consistent, transparent, accurate, and conservative manner and may therefore be reported to the Climate Action Reserve (Reserve) as the basis for issuing carbon offset credits (called Climate Reserve Tonnes, or CRTs).

The Reserve is a national offsets program working to ensure integrity, transparency and financial value in the North American carbon market. It does this by establishing regulatory-quality standards for the development, quantification and verification of GHG emissions reduction projects in North America; issuing carbon offset credits known as CRTs generated from such projects; and tracking the transaction of credits over time in a transparent, publicly-accessible system. Adherence to the Reserve's high standards ensures that emissions reductions associated with projects are real, permanent and additional, thereby instilling confidence in the environmental benefit, credibility and efficiency of the U.S. carbon market.

Only those Forest Projects that are eligible under and comply with the FPP may be registered with the Reserve. Section 9 of this protocol provides requirements and guidance for verifying the performance of project activities and their associated GHG reductions and removals reported to the Reserve.

1.1 About Forests, Carbon Dioxide, and Climate Change

Forests have the capacity to both emit and sequester carbon dioxide (CO₂), a leading greenhouse gas that contributes to climate change. Trees, through the process of photosynthesis, naturally absorb CO₂ from the atmosphere and store the gas as carbon in their biomass, i.e., trunk (bole), leaves, branches, and roots. Carbon is also stored in the soils that support the forest, as well as the understory plants and litter on the forest floor. Wood products that are harvested from forests can also provide long term storage of carbon.

When trees are disturbed, through events like fire, disease, pests or harvest, some of their stored carbon may oxidize or decay over time releasing CO₂ into the atmosphere. The quantity and rate of CO₂ that is emitted may vary, depending on the circumstances of the disturbance. Forests function as reservoirs in storing CO₂. Depending on how forests are managed or impacted by natural events, they can be a net source of emissions, resulting in a decrease to the reservoir, or a net sink, resulting in an increase of CO₂ to the reservoir. In other words, forests may have a net negative or net positive impact on the climate.

Through sustainable management and protection, forests can also play a positive and significant role to help address global climate change. The Reserve's FPP is designed to address the forest sector's unique capacity to sequester, store, and emit CO₂ and to facilitate the positive role that forests can play to address climate change.

Project Operators must affirm the action denoting the project start date by providing documentation. Adequate documentation could include deeds of trust, title reports, conservation easement documentation, dated forest management plans, and/or contracts or agreements.

3.3 Additionality

The Reserve strives to register only projects that yield surplus GHG emission reductions and removals that are additional to what would have occurred in the absence of a carbon offset market (i.e., under “Business As Usual”). For a general discussion of the Reserve’s approach to determining additionality, see the Reserve’s Program Manual (available at <http://www.climateactionreserve.org/how/program/program-manual/>).

Forest Projects must satisfy the following tests to be considered additional:

1. *Legal Requirement Test.* Forest Projects must achieve GHG reductions or removals above and beyond any GHG reductions or removals that would result from compliance with any federal, state, or local law, statute, rule, regulation, or ordinance. Forest Projects must also achieve GHG reductions and removals above and beyond any GHG reductions or removals that would result from compliance with any court order or other legally binding mandates including management plans (such as Timber Harvest Plans) that are required for government agency approval of harvest activities.

Deeded encumbrances, such as timber deeds or conservation easements, may effectively control forest carbon, such that there may be multiple Forest Owners within the Project Area. Deeded encumbrances are considered legally binding mandates for the purposes of the legal requirement test, unless they are recorded within a year of the Forest Project’s start date with clear agreement from all Forest Owners.

Deeded encumbrances may contain terms that do not directly refer to forest carbon, but that nevertheless restrict the effect the ability of any one Forest Owner to change forest carbon stocks. These terms must be interpreted with respect to their effect on forest carbon for the purposes of the legal requirement test and baseline determinations. Where the terms of deeded encumbrances are not explicit with regards to forest carbon, the following assumptions shall be made:

- a. Restrictions or references related to canopy cover, basal area, density, volume, carbon or biomass apply to standing live and dead trees of all species.
 - b. Carbon in other pools (soil, litter, duff, shrubs, etc.) is assumed to be associated with the other defined terms, such as trees.
 - c. Terms related to forest (tree) growth apply to growth in all tree species.
2. *Performance Test.* Forest Projects must achieve GHG reductions or removals above and beyond any GHG reductions or removals that would result from engaging in Business As Usual activities, as defined by the requirements described below (Section 3.3.2).

Project quantification (Section 6) further ensures that forest projects are additional via checks on financial feasibility.

3.3.1 Legal Requirement Test

The legal requirement test is satisfied if the following requirements are met, depending on the type of Forest Project.

3.3.2.3 Avoided Conversion Projects

An Avoided Conversion Project satisfies the performance test if the Project Operator provides a real estate appraisal for the Project Area (as defined in Section 4) indicating the following:

1. *The Project Area is suitable for conversion.* The appraisal must clearly identify the highest value alternative land use for the Project Area and indicate how the physical characteristics of the Project Area are suitable for the alternative land use.
2. The appraisal must conform with the following minimum standards⁷:
 - a. Appraisal reports shall be prepared and signed by a Licensed or Certified Real Estate Appraiser in good standing.
 - b. Appraisal reports shall include descriptive photographs and maps of sufficient quality and detail to depict the subject property and any market data relied upon, including the relationship between the location of the subject property and the market data.
 - c. Appraisal reports shall include a complete description of the subject property land, site characteristics and improvements. Valuations based on a property's development potential shall include:
 - i. Verifiable data on the development potential of the land (e.g., Certificates of Compliance, Tentative Map, Final Map).
 - ii. A description of what would be required for a development project to proceed (e.g., legal entitlements, infrastructure).
 - iii. Presentation of evidence that sufficient demand exists, or is likely to exist in the future, to provide market support for the development.
 - iv. Where conversion to commercial, residential, or agricultural land uses is identified as the highest value alternative land use, the appraisal must demonstrate that the slope of Project Area land is compatible with the alternative land use by identifying two areas with similar average slope conditions to the Project Area that have been converted within the past ten years in the project's Assessment Area. Alternatively, the Project Area must have an average slope less than 40 percent.
 - v. Where conversion to agricultural land use is anticipated, the appraisal must provide:
 - 1) Evidence of soil suitability for the type of expected agricultural land use.
 - 2) Evidence of water availability for the type of expected agricultural land use.
 - 3) Where conversion to mining land use is anticipated, the appraisal must provide evidence of the extent and amount of mineral resources existing in the Project Area.
 - vi. Where conversion to residential, commercial, or recreational land uses is anticipated, the appraisal must also describe the following information:
 - 1) The proximity of the Project Area to metropolitan areas
 - 2) The proximity of the Project Area to grocery and fuel services and accessibility of those services
 - 3) Population growth within 180 miles of the Project Area
 - d. Appraisal reports shall include a statement by the appraiser indicating to what extent land title conditions were investigated and considered in the analysis and value conclusion.

⁷ Adapted from Sections 5096.501 and 5096.517, Public Resources Code, State of California.

to this rule is for Reforestation Projects, which may defer a second site visit verification beyond six years, at the Project Operator's discretion. The third and subsequent site visit verifications for Reforestation Projects must continue on a six-year cycle.

There are three possible exceptions to this minimum time commitment:

1. A Forest Project automatically terminates if a Significant Disturbance occurs,¹⁰ leading to an Unavoidable Reversal that reduces the project's standing live tree carbon stocks below the project's baseline standing live tree carbon stocks. Once a Forest Project terminates in this manner, the Project Operator has no further obligations to the Reserve.
2. A Forest Project may be voluntarily terminated prior to the end of its minimum time commitment if the Project Operator retires a quantity of CRTs, as specified under Retiring CRTs Following Project Termination, below.
3. A Forest Project may be automatically terminated if there is a breach of certain terms described within the Project Implementation Agreement. Such a termination will require the Project Operator to retire a quantity of CRTs, as specified under 'Retiring CRTs Following Project Termination' below.

Retiring CRTs Following Project Termination

1. For a Reforestation or Avoided Conversion Project, the Project Operator must retire a quantity of CRTs from its Reserve account equal to the total number of CRTs issued to the project over the preceding 100 years.
2. For an Improved Forest Management Project, the Project Operator must retire a quantity of CRTs from its Reserve account equal to the total number of CRTs issued to the project over the preceding 100 years, multiplied by the appropriate compensation rate indicated in Table 3.1.
3. For any project seeking to terminate project activities on only a portion of the project area, the change must be treated as a potential Avoidable Reversal. If it is determined that the revision to the project area would lead to an Avoidable Reversal, then credits must be retired as described in Section 7.3.2. Improved Forest Management projects must also apply the early termination compensation rate in Table 3.1 below. If the revision to the project area would lower standing live carbon stocks below baseline levels, then this will be considered a complete project termination.
4. In addition:
 - a. The retired CRTs must be those that were issued to the Forest Project, or that were issued to other Forest Projects registered with the Reserve.
 - b. The retired CRTs must be designated in the Reserve's software system as compensating for an Avoidable Reversal.

¹⁰ The natural disturbance shall not be the result of intentional or grossly negligent acts of any of the Forest Owners.

Qualified Conservation Easements and Qualified Deed Restrictions must be recorded no earlier than one year before a project's start date. If a Qualified Conservation Easement or Qualified Deed Restriction was recorded more than one year prior to the start date, the limits imposed by the easement or deed restriction on forest management activities must be considered as a legal mandate for the purpose of satisfying the legal requirement test for additionality (Section 3.3.1) and in determining the project's baseline (Section 6).

3.8 Regulatory Compliance

Each time the Forest Project is verified, the Project Operator must attest that the project is in material compliance with all applicable laws relevant to the project activity. For this protocol, instances of non-compliance are likely to be considered "material" if they directly pertain to the management of project carbon stocks. Project Operators are required to disclose in writing to the verifier any and all instances of material non-compliance of the project with any law. If a verifier finds that a project is in a state of material non-compliance, then CRTs will not be issued for GHG reductions that occurred during the period of non-compliance. Non-compliance solely due to administrative or reporting issues, or due to "acts of nature," will not affect CRT crediting.

3.9 Sustainable Harvesting and Natural Forest Management Practices

Forest Projects can create long-term climate benefits as well as provide other environmental benefits, including the sustaining of natural ecosystem processes. To be in conformance with this protocol, Forest Projects must:

1. Employ sustainable long-term harvesting practices, both within their Project Area and on other forest landholdings controlled by the Project Operator and its Affiliate(s) within the project's Assessment Area(s), as described in Section 3.9.1. Forest landholdings are considered "controlled" by the Project Operator if the Project Operator owns the land in fee, or has been deeded timber rights on it.
2. Employ Natural Forest Management practices within the Project Area, including meeting species composition, forest structure, and age and habitat distribution requirements, as described in Section 3.9.2.
3. Maintain or increase standing live carbon stocks over the project life, as described in Section 3.9.3.

3.9.1 Sustainable Harvesting Practices

At the time commercial harvesting is initiated on any of the forest landholdings controlled by the Project Operator and its Affiliate(s) within the project's Assessment Area(s), the Project Operator and its Affiliate(s) must employ and demonstrate sustainable long-term harvesting practices on all of its forest landholdings within the project's Supersection(s), including the Project Area, using one of the following options:

1. Certification under the Forest Stewardship Council, Sustainable Forestry Initiative, or Tree Farm System certification programs. Regardless of the program, the terms of certification must require adherence to and verification of harvest levels which can be permanently sustained over time.

demonstrate progress towards meeting these criteria at the times identified in Table 3.3 are compliant with the protocol.

1. Species Composition

All Forest Projects are required to establish and/or maintain forest types that are native to the Project Area. For the purposes of this protocol, native forests are defined as those forests occurring naturally in an area, as neither a direct nor indirect consequence of human activity post-dating European settlement.

For the purposes of the FPP, the definition of native forests for each Assessment Area is based on reference metrics provided in an Assessment Area Data File, a companion document to the FPP available on the Reserve's website. The planting of native species outside of their current distribution is allowed up to 5% of the overall native species requirement as an adaptation strategy due to climate change. Plantings that will result in more than 5% of native species from beyond their current distribution must be done in accordance with a state or federally approved adaptation plan, or a local plan that has gone through a transparent public review process. In all cases, the Project Operator must obtain a written statement from the government agency in charge of forestry regulation in the state where the project is located stipulating that the planting of native trees outside their current range is appropriate as an adaptation to climate change. The specifications for meeting the requirements for species composition are included in Table 3.3.

2. Forest Structure

A variety of silvicultural practices may be employed in the Project Area during the course of a Forest Project, though the protocol does not endorse any particular practice. Any practices employed, however, must meet a minimum set of standards to ensure environmental integrity associated with a balanced distribution of age and habitat classes across the landscape, as well as certain structural elements within the forest.

Harvesting may be conducted within forest projects using a variety of silviculture methods. However, to ensure harvest practices maintain habitat refugia, even-aged rotations are limited to the following guidelines in Table 3.2.

Table 3.2. Even-Aged Management Retention Guidelines

Harvest Retention (Square Feet Basal Area/Acre of All Species)	Maximum Size of Harvest Block (Acres)
0	40
$\geq 15 < 20$	60
$\geq 20 < 25$	80
$\geq 25 < 30$	120
$\geq 30 < 40$	400
$\geq 40 < 50$	600
≥ 50	Unlimited

Where any harvest occurs in harvest blocks where the harvest retention is less than 50 square feet of basal area per acre, additional harvesting may only occur within 300 feet of the harvest area (with less than 50 square feet basal area per acre) if the harvest retention of the additional harvest exceeds 50 square feet of basal area per acre. This requirement shall remain in place until the regeneration within the original harvested area (i.e., with retention less than 50 square feet basal area per acre) achieves a height of five feet or is five years old.

Composition of Native Species		
<p>Improved Forest Management, Avoided Conversion Projects, and Reforestation Projects older than 12 years.</p> <p>No single species' prevalence, measured as the percent of the basal area of all live trees in the Project Area, exceeds the percentage value shown under the heading 'Composition of Native Species' in the Assessment Area Data File maintained on the Reserve's website.</p> <p>Early Reforestation (Less than 12 years)</p> <p>To the extent seed is available, and/or physical site characteristics permit, Reforestation Projects must achieve a mixture of native species no single species' prevalence, measured as the percent of all live tree stems in the Project Area, exceeds the percentage value shown under the heading 'Composition of Native Species' in the Assessment Area table in the Assessment Area Data File maintained on the Reserve's website.</p> <p>All Projects</p> <p>Where the Project Area naturally consists of a single species dominance, the Project Operator may obtain a letter from the State Forester or his/her representative stating that the Project Area's species diversity is reflective of background natural species diversity (despite any inconsistencies with the Assessment Area Data File).</p> <p>Projects must show continuous progress toward criteria. These criteria must be met within 50 years, except in cases where a variance has been granted at the initial verification, a Significant Disturbance has impacted species diversity, or natural mortality takes a project out of compliance</p>	<p>Species composition is assessed at initial verification from inventory data. Species composition is also assessed during the project at each site visit verification.</p>	<p>Applies to all project types throughout the project life. All the project's Reserve account activity will be suspended until the criterion is met (excluding the aforementioned exceptions).</p>
Distribution of Age Classes		
<p>On a watershed scale up to 10,000 acres (or the Project Area, whichever is smaller), all projects must maintain, or make progress toward maintaining, no more than 40 percent of their forested acres in ages less than 20 years. (Areas impacted by Significant Disturbance may be excluded from this test.)</p> <p>Applies to all project types at first commercial harvest. Project must show continuous progress toward criterion. This criterion must be met within 25 years</p>	<p>Age classes are assessed during project life at each site visit verification.</p>	<p>All Reserve account activity will be suspended until the criterion is met.</p>
Structural Elements (Standing and Lying Dead Wood)		
<p>Project Operators must ensure that dead wood is recruited and maintained in sufficient quantities, as described below.</p> <p>Option I. Monitoring dead wood throughout Project Area.</p> <p>Project Operators may maintain inventories of lying dead wood as part of their normal inventory processes. Where inventory measurements are used to demonstrate</p>	<p>Assessed during project at each site visit verification.</p>	<p>Applies to all project types throughout the project life. All Reserve account activity will be suspended until the areas verified since the previous site-verification meet the requirement.</p>

Exceptions to this policy are allowed where reductions in standing live carbon stocks are important for maintaining and enhancing forest health, environmental co-benefits, or the long-term security of all carbon stocks; where reductions are due to non-harvest disturbances; or where reductions are required by law. Note that these exceptions in no way change or affect the Reserve's policies and requirements related to compensating for reversals, as detailed in Section 7.3.

Forest Project standing live carbon stocks that have decreased over a ten-year period may continue to receive CRTs issued by the Reserve for verified GHG reductions and removals if, and only if, the decrease in standing live carbon stocks is due to one of the following causes:

1. The decrease is demonstrably necessary to substantially improve the Project Area's resistance to wildfire, insect, or disease risks. The Project Operator must document the risks and the actions that will be taken to reduce the risks. The techniques used to improve resistance must be supported by relevant published peer reviewed research.
2. The decrease is associated with a planned balancing of age classes (regeneration, sub-merchantable, and merchantable) and is detailed in a long term environmentally responsible management plan. The Project Operator must demonstrate, using documentation submitted to the Reserve at the time of the Forest Project's registration, that the balancing of age classes, resulting in a decrease in the standing live carbon stocks, was planned at the initiation of the Forest Project (Figure 3.1).

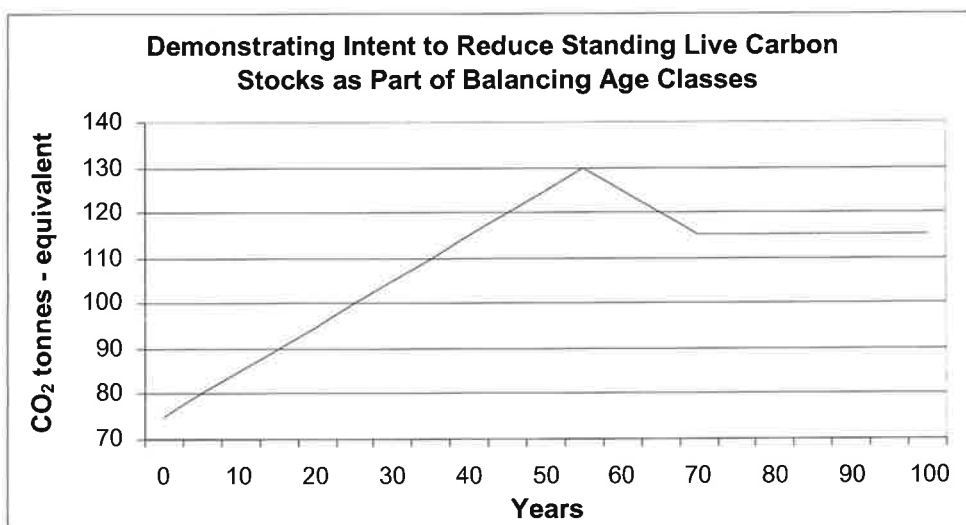


Figure 3.1. Example of Reducing Standing Live Carbon Stocks as Part of Balancing Age Classes

3. The decrease is part of normal silviculture cycles for forest ownerships less than 1,000 acres. Inventory fluctuations are a normal part of silvicultural activities. Periodic harvest may remove more biomass than the biomass growth over the past several years. At no time shall the Forest Project's inventory of carbon in the standing live carbon stocks fall below the Forest Project's baseline carbon stock estimates for the standing live carbon stocks, or 20 percent less than the Forest Project's standing live carbon stocks at the project's initiation, whichever is higher. Documentation submitted to the Reserve at the time the Forest Project is registered must indicate that fluctuations in the Forest Project's standing live carbon stocks are an anticipated silvicultural activity and that the overall

4 Identifying the Project Area

The geographic boundaries defining the Project Area must be described in detail at the time a Forest Project is listed on the Reserve. The boundaries must be defined using a map, or maps that displays public and major private roads, major watercourses (fourth order or greater), topography, towns, and Public Land Survey Townships, Ranges, and Sections or latitude and longitude. The maps must be of adequate resolution to clearly identify the required features.

Once a project's Supersection(s) has been identified, Assessment Area(s) must be determined. A project may do this by comparing dominant species present in the project inventory to the list of native species provided in the Assessment Area Data File. Projects may also utilize Landfire Existing Vegetation Types (EVT) to determine the most appropriate Assessment Areas for the project. EVT descriptions must be used to identify the species descriptions that most closely match the native species provided in the Assessment Area Data File. The Reserve also reserves the right to provide a spatially explicit map of Assessment Areas to be used for identification purposes. The Project Area may also extend across multiple Assessment Areas within a Supersection (see Guidance for Determining Common Practice on the [Assessment Area Data webpage](#)), and across no more than two adjacent Supersections.

A Geographical Information System (GIS) file depicting the Project Area must be submitted to the Reserve with the project. The file must be submitted in the KML file format. The Project Area can be contiguous or separated into tracts or distinct polygons. Additionally, the current assessor's parcel identification numbers associated with the project area must be submitted to the Reserve.

For Improved Forest Management Projects, the geographic boundaries may be defined such that non-forested areas, or areas not under forest management, are excluded from the Project Area.

For Reforestation Projects, the Project Area must be on land that has had less than ten percent tree canopy cover for a minimum of ten years, or that have been subject to a Significant Disturbance that resulted in at least 20 percent of the carbon stocks being emitted. Reforestation Projects may submit a provisional project boundary that must be amended to the actual areas reforested within the provisional project boundary by the second site visit verification.

For Avoided Conversion Projects, the Project Area is defined through the required appraisal process. The Project Area must be determined following the guidance in Table 4.1 based on the type of anticipated conversion.

If there is a significant discrepancy between AP and GIS acres, the Project Operator may work with the county assessor to resolve any disputed AP acres.

4.3 Modifying the Project Area

It is possible for project activities to be terminated on a portion of the Project Area. These adjustments must be treated as Avoidable Reversals, as described in Section 3.5. If a project proceeds with terminating the project on a portion of the Project Area, a new KML file must be provided to reflect the new Project Area. An addendum to the Project Design Document (PDD) must also be submitted to reflect this change, and the new legal description of the project will be recorded with the next PIA or PIA Amendment after the change has been verified. The inventory for the modified Project Area will be assessed during the next regularly scheduled site visit verification, unless it is determined that an Avoidable Reversal has taken place, in which case, the guidance in Section 7.3.2 must be followed.

SSR	Description	Type	Gas	Included or Excluded	Relevant to Baseline or Project	Justification/Explanation
RF-2	Shrubs and herbaceous understory carbon	Reservoir / Pool	CO ₂	<i>Included for site preparation activities</i>	Baseline: Measured and assumed to be static with start date inventory estimates Project: Estimated decrease at project initiation with site preparation and assumed static thereafter	Shrubs and herbaceous understory may constitute a significant portion of carbon affected by Reforestation Projects as part of site preparation.
RF-3	Standing dead carbon (carbon in all portions of dead, standing trees)	Reservoir / Pool	CO ₂	<i>Included for project activities</i>	Baseline: N/A Project: Measured by updating forest carbon inventory. Does not include pre-existing dead and dying trees at project commencement.	<p>Reforestation Projects are often implemented following disturbance events. Dead trees may continue to fall, become lying dead wood, and contribute to a reversal, even though the primary effect of planting trees continues to increase over time. The protocol requires recruitment and retention of dead material, including standing dead wood as a structural element, so further quantification is not required for standing dead carbon present at project commencement. Minimum volume thresholds are stated to meet Natural Forest Management criteria. (See Section 3.9.2). However, projects must measure planted trees that become standing dead trees, as this is part of the project's primary effect. Projects should define the project year in which standing dead carbon will begin to be measured in the Project Design Document.</p>
RF-4	Lying dead wood carbon	Reservoir / Pool	CO ₂	<i>Excluded</i>	Baseline: N/A Project: N/A	<p>Lying dead wood may constitute a significant amount of carbon affected by Reforestation Projects as part of site preparation. However, it is assumed that a comparable quantity of lying dead wood will decompose over the course of the 100-year modeled baseline. Since no significant change is expected between the baseline and project scenarios, lying dead wood will be accounted for through the Natural Forest Management criteria.</p> <p>For Natural Forest Management criteria, the protocol requires recruitment and retention of dead material, including lying dead wood as a structural element. Minimum volume thresholds are stated to meet Natural Forest Management criteria. (See Section 3.9.2).</p>
RF-5	Litter and duff carbon (carbon)	Reservoir / Pool	CO ₂	<i>Excluded</i>	Baseline: N/A	Carbon from litter and duff may be affected by Reforestation Projects

SSR	Description	Type	Gas	Included or Excluded	Relevant to Baseline or Project	Justification/Explanation
						(standing live carbon) has occurred within the Project Area within the last 10 years.
RF-10	Mobile combustion emissions from site preparation activities	Source	CO ₂	Included	Baseline: N/A Project: Estimated using default emission factors	Mobile combustion CO ₂ emissions from Reforestation Project site preparation activities can be significant relative to total GHG reductions/removals. In general, this protocol assumes that combustion emissions in the U.S. will be controlled under a regulatory cap-and-trade program in the near future, and can therefore be ignored in the context of Forest Project GHG accounting. Since these emissions are not currently capped, however, and because site preparation is a one-time event rather than an ongoing source of emissions, mobile combustion emissions are included in the GHG Assessment Boundary for this version of the Forest Project Protocol.
			CH ₄	Excluded	Baseline: N/A Project: N/A	Changes in CH ₄ emissions from mobile combustion associated with site preparation activities are not considered significant.
			N ₂ O	Excluded	Baseline: N/A Project: N/A	Changes in N ₂ O emissions from mobile combustion associated with site preparation activities are not considered significant.
RF-11	Mobile combustion emissions from ongoing project operation and maintenance	Source	CO ₂	Excluded	Baseline: N/A Project: N/A	Mobile combustion CO ₂ emissions from ongoing project operation and maintenance are unlikely to be significantly different from baseline levels, and are therefore not included in the GHG Assessment Boundary. In addition, this protocol assumes that such emissions will be controlled under a regulatory cap-and-trade program in the near future, meaning that changes in activity due to the Forest Project will have no effect on total net emissions.
			CH ₄	Excluded	Baseline: N/A Project: N/A	CH ₄ emissions from mobile combustion associated with ongoing project operation and maintenance activities are not considered significant.
			N ₂ O	Excluded	Baseline: N/A Project: N/A	N ₂ O emissions from mobile combustion associated with ongoing project operation and maintenance activities are not considered significant.
RF-12	Stationary combustion emissions from	Source	CO ₂	Excluded	Baseline: N/A Project: N/A	Stationary combustion CO ₂ emissions from ongoing project operation and maintenance could

SSR	Description	Type	Gas	Included or Excluded	Relevant to Baseline or Project	Justification/Explanation
						from the GHG Assessment Boundary.
RF-15	Combustion emissions from production, transportation, and disposal of forest products	Source	CO ₂	<i>Excluded</i>	Baseline: N/A Project: N/A	This protocol assumes that combustion emissions will be controlled under a regulatory cap-and-trade program in the near future. Thus, for most of a Forest Project's duration, changes in activity due to the project will have no effect on total net emissions due to production, transportation, and disposal of forest products. These emissions are therefore excluded from the GHG Assessment Boundary.
			CH ₄	<i>Excluded</i>	Baseline: N/A Project: N/A	Combustion-related CH ₄ emissions related to changes in the production, transportation, and disposal of forest products are not considered significant.
			N ₂ O	<i>Excluded</i>	Baseline: N/A Project: N/A	Combustion-related N ₂ O emissions related to changes in the production, transportation, and disposal of forest products are not considered significant.
RF-16	Combustion emissions from production, transportation, and disposal of alternative materials to forest products	Source	CO ₂	<i>Excluded</i>	Baseline: N/A Project: N/A	Changes in forest-product production may cause consumers of these products to increase or decrease their consumption of substitute materials (such as alternative building materials, including cement or steel). In many cases, alternative materials will have higher combustion GHG emissions associated with their production, transportation, and/or disposal than wood products. This protocol assumes, however, that combustion emissions will be controlled under a regulatory cap-and-trade program in the near future. Thus, for most of a Forest Project's duration, changes in activity due to the project will have no effect on total net emissions due to production, transportation, and disposal of alternative materials. These emissions are therefore excluded from the GHG Assessment Boundary.
			CH ₄	<i>Excluded</i>	Baseline: N/A Project: N/A	Combustion-related CH ₄ emissions related to changes in the production, transportation, and disposal of alternative materials are not considered significant.
			N ₂ O	<i>Excluded</i>	Baseline: N/A Project: N/A	Combustion-related N ₂ O emissions related to changes in the production, transportation, and disposal of alternative materials are not considered significant.

SSR	Description	Type	Gas	Included or Excluded	Relevant to Baseline or Project	Justification/Explanation
IFM-3	Standing dead carbon (carbon in all portions of dead, standing trees)	Reservoir / Pool	CO ₂	<i>Included</i>	Baseline: Assumed to be static based on initial field inventory measurements Project: Measured by updating forest carbon inventory	Improved Forest Management Projects may significantly increase standing dead carbon stocks over time. The protocol requires recruitment and retention of dead material, including standing dead wood as a structural element. Minimum volume thresholds are stated to meet Natural Forest Management criteria. (See Section 3.9.2).
IFM-4	Lying dead wood carbon	Reservoir / Pool	CO ₂	<i>Excluded</i>	Baseline: N/A Project: N/A	<p>Lying dead wood is highly variable and it is therefore difficult to achieve accurate estimates. It also constitutes a minor portion of forest carbon. With required retention for Natural Forest Management (see below), it is a conservative programmatic measure not to include it.</p> <p>For Natural Forest Management criteria, the protocol requires recruitment and retention of dead material, including lying dead wood as a structural element. Minimum volume thresholds are stated to meet Natural Forest Management criteria. (See Section 3.9.2).</p>
IFM-5	Litter and duff carbon (carbon in dead plant material)	Reservoir / Pool	CO ₂	<i>Excluded</i>	Baseline: N/A Project: N/A	Changes in this reservoir are unlikely to have a significant effect on total quantified GHG reductions/removals. It is a conservative programmatic measure not to include it.
IFM-6	Soil carbon	Reservoir / Pool	CO ₂	<i>Included for emissions estimates</i>	Baseline: Assumed to be static with start date inventory estimates Project: Emissions from project activities estimated with standardized guidelines in found in the Quantification Guidance on the FPP webpage .	Soil carbon is not anticipated to change significantly as a result of most Improved Forest Management activities. However, all projects must use standardized guidance to account for potential soil carbon emissions associated with management activities.
IFM-7	Carbon in in-use forest products	Reservoir / Pool	CO ₂	<i>Included</i>	Baseline: Estimated from modeled harvesting volumes Project: Estimated from measured harvesting volumes	Included because many Improved Forest Management Projects may significantly change carbon storage in in-use forest products relative to baseline levels. Treated as a "source/sink" because forest product carbon is quantified according to the change in harvesting volumes, relative to baseline levels, in each year. Of this change (increase or decrease), only the

SSR	Description	Type	Gas	Included or Excluded	Relevant to Baseline or Project	Justification/Explanation
						with site preparation activities are not considered significant.
IFM-11	Mobile combustion emissions from ongoing project operation and maintenance	Source	CO ₂	<i>Excluded</i>	Baseline: N/A Project: N/A	Mobile combustion CO ₂ emissions from ongoing project operation and maintenance are unlikely to be significantly different from baseline levels, and are therefore not included in the GHG Assessment Boundary. In addition, this protocol assumes that such emissions will be controlled under a regulatory cap-and-trade program in the near future, meaning that changes in activity due to the Forest Project will have no effect on total net emissions.
			CH ₄	<i>Excluded</i>	Baseline: N/A Project: N/A	Changes in CH ₄ emissions from mobile combustion associated with ongoing project operation and maintenance activities are not considered significant.
			N ₂ O	<i>Excluded</i>	Baseline: N/A Project: N/A	Changes in N ₂ O emissions from mobile combustion associated with ongoing project operation and maintenance activities are not considered significant.
IFM-12	Stationary combustion emissions from ongoing project operation and maintenance	Source	CO ₂	<i>Excluded</i>	Baseline: N/A Project: N/A	Stationary combustion CO ₂ emissions from ongoing project operation and maintenance could include GHG emissions associated with electricity consumption or heating/cooling at Project Operator facilities, or at facilities owned or controlled by contractors. These emissions are unlikely to be significantly different from baseline levels, and are therefore not included in the GHG Assessment Boundary. In addition, this protocol assumes that such emissions will be controlled under a regulatory cap-and-trade program in the near future, meaning that changes in activity due to the Forest Project will have no effect on total net emissions.
			CH ₄	<i>Excluded</i>	Baseline: N/A Project: N/A	Changes in CH ₄ emissions from stationary combustion associated with ongoing project operation and maintenance activities are not considered significant.
			N ₂ O	<i>Excluded</i>	Baseline: N/A Project: N/A	Changes in N ₂ O emissions from stationary combustion associated with ongoing project operation and maintenance activities are not considered significant.

SSR	Description	Type	Gas	Included or Excluded	Relevant to Baseline or Project	Justification/Explanation
						higher combustion GHG emissions associated with their production, transportation, and/or disposal than wood products. This protocol assumes, however, that combustion emissions will be controlled under a regulatory cap-and-trade program in the near future. Thus, for most of a Forest Project's duration, changes in activity due to the project will have no effect on total net emissions due to production, transportation, and disposal of alternative materials. These emissions are therefore excluded from the GHG Assessment Boundary.
			CH ₄	<i>Excluded</i>	Baseline: N/A Project: N/A	Combustion-related CH ₄ emissions related to changes in the production, transportation, and disposal of alternative materials are not considered significant.
			N ₂ O	<i>Excluded</i>	Baseline: N/A Project: N/A	Combustion-related N ₂ O emissions related to changes in the production, transportation, and disposal of alternative materials are not considered significant.
IFM-17	Biological emissions from decomposition of forest products	Source	CO ₂	<i>Included</i>	Baseline: Quantified as a component of calculating carbon stored for 100 years in wood products (SSR IFM-7) and landfills (SSR IFM-8) Project: Quantified as a component of calculating carbon stored for 100 years in wood products (SSR IFM-7) and landfills (SSR IFM-8)	CO ₂ emissions from the decomposition of forest products are built into calculations of how much forest product carbon will remain in in-use wood products and in landfills, averaged over 100 years (see SSR IFM-7 and Quantification Guidance on the FPP webpage).
			CH ₄	<i>Excluded</i>	Baseline: N/A Project: N/A	In-use wood products will produce little to no CH ₄ emissions. CH ₄ emissions can result from anaerobic decomposition of forest products in landfills. This protocol assumes that landfill CH ₄ emissions will be largely controlled in the near future due to federal and/or state regulations. Thus, changes in forest-product production are assumed to have no significant effect on future CH ₄ emissions

SSR	Description	Type	Gas	Included or Excluded	Relevant to Baseline or Project	Justification/Explanation
						For Natural Forest Management criteria, the protocol requires recruitment and retention of dead material, including lying dead wood as a structural element. Minimum volume thresholds are stated to meet Natural Forest Management criteria. (See Section 3.9.2).
AC-5	Litter and duff carbon (carbon in dead plant material)	Reservoir / Pool	CO ₂	<i>Excluded</i>	Baseline: N/A Project: N/A	Exclusion of litter and duff carbon is programmatically conservative for accounting of total quantified GHG reductions/removals, since project activities most likely will lead to increases in litter and duff carbon. Litter and duff is highly variable, difficult to measure accurately, and therefore challenging to achieve confidence with estimates.
AC-6	Soil carbon	Reservoir / Pool	CO ₂	<i>Optional for reporting project benefits</i> <i>Included for reporting project emissions</i>	Baseline: When included, assumed to have emissions and emission rates according to soil order and baseline conversion activity Project: Emissions calculated using standardized guidance in the Soil Quantification Guidance on the FPP webpage . Project Operators may opt to quantify net removals or avoided emissions by updating forest soil carbon inventory	Soil carbon is likely a large primary effect of an Avoided Conversion Project. It is conservative to exclude the conversion effect on soil from the project accounting, which is why it is optional. All projects must use standardized guidance to account for potential soil carbon emissions associated with project management activities. If Project Operators choose to quantify net removals or avoided emissions from soil carbon, they may do so by undertaking and updating a soil carbon inventory.
AC-7	Carbon in in-use forest products	Reservoir / Pool	CO ₂	<i>Included</i>	Baseline: Estimated from modeled harvesting volumes Project: Estimated from measured harvesting volumes	Included because many Avoided Conversion Projects may significantly change carbon storage in in-use forest products relative to baseline levels. Treated as a "source/sink" because forest product carbon is quantified according to the change in harvesting volumes, relative to baseline levels, in each year. Of this change (increase or decrease), only the average amount of carbon expected to remain stored for 100 years is included in the final quantification of annual net GHG removals/emissions. This approach accounts for CO ₂ emissions from decomposition or disposal of wood products (see SSR AC-17).
AC-8	Forest product carbon in landfills	Reservoir / Pool	CO ₂	<i>Excluded when project harvesting exceeds baseline</i>	Baseline: Estimated from modeled harvesting volumes	Because of significant uncertainties associated with forecasting the quantity of forest product carbon that will remain stored in landfills, landfill carbon is excluded from quantification in years when project harvesting volumes

SSR	Description	Type	Gas	Included or Excluded	Relevant to Baseline or Project	Justification/Explanation
					Project: N/A	project operation and maintenance activities are not considered significant.
AC-12	Stationary combustion emissions from ongoing project operation and maintenance	Source	CO ₂	<i>Excluded</i>	Baseline: N/A Project: N/A	Stationary combustion CO ₂ emissions from ongoing project operation and maintenance could include GHG emissions associated with electricity consumption or heating/cooling at Project Operator facilities, or at facilities owned or controlled by contractors. These emissions are unlikely to be significantly different from (or will be lower than) baseline levels and are therefore not included in the GHG Assessment Boundary. In addition, this protocol assumes that such emissions will be controlled under a regulatory cap-and-trade program in the near future, meaning that changes in activity due to the Forest Project will have no effect on total net emissions.
			CH ₄	<i>Excluded</i>	Baseline: N/A Project: N/A	Changes in CH ₄ emissions from stationary combustion associated with ongoing project operation and maintenance activities are not considered significant.
			N ₂ O	<i>Excluded</i>	Baseline: N/A Project: N/A	Changes in N ₂ O emissions from stationary combustion associated with ongoing project operation and maintenance activities are not considered significant.
AC-13	Biological emissions from clearing of forestland outside the Project Area	Source	CO ₂	<i>Included</i>	Baseline: N/A Project: Estimated using default forestland conversion factors	Avoided Conversion Projects may cause land-use pressures to shift to other forestlands, causing biological emissions that partially negate the benefits of the project.
AC-14	Biological emissions/removals from changes in harvesting on forestland outside the Project Area	Source / Sink	CO ₂	<i>Excluded</i>	Baseline: N/A Project: N/A	Over time, Avoided Conversion Projects will tend to increase harvesting levels relative to the baseline, potentially causing other landowners to reduce harvesting in response to increased wood product supply. The reduction in harvesting may lead to increased carbon stocks on other lands. Carbon stock increases on other lands are excluded from the GHG Assessment Boundary, however, because it is not possible to ensure their permanence. Avoided Conversion Projects are not expected to cause an increase in harvesting on other lands over the long run (except where clearing is involved for other land uses, per SSR AC-13), so this potential effect is also excluded from the GHG Assessment Boundary.
AC-15	Combustion emissions from production, transportation,	Source	CO ₂	<i>Excluded</i>	Baseline: N/A Project: N/A	This protocol assumes that combustion emissions will be controlled under a regulatory cap-and-trade program in the near future. Thus, for most of a Forest

SSR	Description	Type	Gas	Included or Excluded	Relevant to Baseline or Project	Justification/Explanation
					stored for 100 years in wood products (SSR AC-7) and landfills (SSR AC-8)	
			CH ₄	<i>Excluded</i>	Baseline: N/A Project: N/A	In-use wood products will produce little to no CH ₄ emissions. CH ₄ emissions can result from anaerobic decomposition of forest products in landfills. This protocol assumes that landfill CH ₄ emissions will be largely controlled in the near future due to federal and/or state regulations. Thus, changes in forest-product production are assumed to have no significant effect on future CH ₄ emissions from anaerobic decomposition of forest products in landfills. These emissions are therefore excluded from the GHG Assessment Boundary.
			N ₂ O	<i>Excluded</i>	Baseline: N/A Project: N/A	Decomposition of forest is not expected to be a significant source of N ₂ O emissions.

- a. Taking the difference between actual onsite carbon stocks for the current year and actual onsite carbon stocks for the prior year¹³
 - b. Subtracting from (a) the difference between baseline onsite carbon stocks for the current year and baseline onsite carbon stocks for the prior year¹⁴
 - c. Adding to (b) the calculated difference between actual and baseline carbon in harvested wood products for the current year (see Equation 6.1)
6. **Quantifying the project's Secondary Effects.** Each year, the Project Operator must quantify the actual change in GHG emissions or removals associated with the Forest Project's unintended ("Secondary") effects, as defined in Section 5. Requirements and guidance for quantifying Secondary Effects are provided below for each type of Forest Project.
7. **Calculating total net GHG reductions and removals.** For each year, total net GHG reductions and removals are calculated by summing a Forest Project's Primary and Secondary Effects. If the result is positive, then the Forest Project has generated GHG reductions and/or removals in the current year. If the result is negative, this may indicate a reversal has occurred (see Section 7).¹⁵

Requirements and guidance for how to perform quantification steps 1 to 4 for each Forest Project type are presented in the remainder of this section.

The required formula for quantifying annual net GHG reductions and removals is presented in Equation 6.1. Net GHG reductions and removals must be quantified and reported in units of carbon dioxide-equivalent (CO₂e) metric tons.

¹³For the purposes of calculating the project's Primary Effect, actual and baseline carbon stocks prior to the start date of the project are assumed to be zero.

¹⁴ See footnote 13.

¹⁵ A reversal occurs only if: (1) total net GHG reductions and removals for the year are negative; and (2) CRTs have previously been issued to the Forest Project. If calculated GHG reductions and removals are negative and no CRTs have been issued to the project since its start date, then the result should be treated as a "negative carryover" to GHG reduction calculations in subsequent years (variable N_{y-1} in Equation 6.1). This may happen, for example, because the confidence deduction applied to actual onsite carbon stocks can result in actual values being less than baseline values in a Forest Project's initial years.

1. Use a model (see the [Quantification Guidance](#)) to determine the *average* amount of carbon in standing live carbon stocks (prior to delivery to a mill) that would have been harvested in each year of the baseline over 100 years. The result will be a uniform estimate of harvested carbon in each year of the baseline. This estimate is determined at the project outset, using the same biomass equations used to calculate biomass in live trees, and will not change over the course of the project.
2. On an annual basis, determine the amount of harvested carbon that would have remained stored in wood products, averaged over 100 years, following the requirements in the [Quantification Guidance](#).

6.1.3 Determining Actual Onsite Carbon Stocks

Actual carbon stocks for Reforestation Projects must be determined by updating the Project Area's forest carbon inventory. This is done by:

1. Incorporating any new forest inventory data obtained during the previous year into the inventory estimate. Any plots sampled during the previous year must be incorporated into the inventory estimate.
2. Using an approved model to "grow" (project forward) prior-year data from existing forest inventory plots to the current reporting year. Approved growth models are identified in the [Quantification Guidance](#). Guidance for projecting forest inventory plot data using models is also provided in the [Quantification Guidance](#).
3. Updating the forest inventory estimate for harvests and/or disturbances that have occurred during the previous year.
4. Applying an appropriate confidence deduction for the inventory based on its statistical uncertainty, following the guidance in the [Quantification Guidance](#).

6.1.4 Determining Actual Carbon in Harvested Wood Products

Perform the following steps to determine actual carbon in harvested wood products:

1. Determine the actual amount of carbon in standing live carbon stocks (prior to delivery to a mill) harvested in the current year (based on harvest volumes determined in Section 6.1.3).
2. Determine the amount of actual harvested carbon that will remain stored in wood products, averaged over 100 years, following the requirements in the [Quantification Guidance](#).

6.1.5 Quantifying Secondary Effects

For Reforestation Projects, significant Secondary Effects can arise from two sources:

1. Combustion emissions associated with machinery use in site preparation.
2. The shifting of cropland or grazing activities to forestland outside the Project Area (which may be both a market and/or physical response to the project activity), which is accounted for over the life of the project.

To quantify combustion emissions associated with site preparation, Project Operators must use the appropriate standard emission factor from Table 6.1 corresponding to the level of brush

Figure 6.1. Activity Shifting ("Leakage") Risk Assessment for Reforestation Projects

Total Secondary Effect emissions for Reforestation Projects are calculated as follows (Equation 6.4). The value for Secondary Effect emissions will always be negative or zero.

Equation 6.4. Total Secondary Effect Emissions

In the formulas throughout this section, initial carbon stocks are denoted by the variable PUB_0 (i.e., the *preliminary unadjusted baseline* at time zero).

Step 2 – Model Growth and Harvesting Over 100 Years

The *preliminary unadjusted baseline* for onsite carbon stocks must be estimated through a modeling exercise. The modeling exercise must use the inventories of the carbon from Step 1 as a starting point for modeling. The *preliminary unadjusted baseline* will consist of each of the following carbon pools that are maintained separately during this stage of baseline development:

If legal constraints do *not* result in an upward trend in aboveground standing live carbon stocks, then the periodic model outputs must be averaged using Equation 6.5.

If legal constraints do result in an increasing trend of aboveground standing live carbon stocks, beginning at the project start date, then the periodic model outputs may be standardized using a straight-line approximation, as defined in Equation 6.6. The approximation must consist of two line segments. The first of the line segments must initiate at the initial inventory at the project start date and terminate at the point where carbon stocks reach their highest legally required level. The second segment is a straight line with a constant value, defined by the terminus of the first line segment, for the balance of the 100-year modeling timeframe.

Equation 6.5. Formula for Averaging *Preliminary Unadjusted Baseline Carbon Stocks*

For all years y ,

standardized adjusted baseline for aboveground standing live and standing dead carbon stocks may not be below either (1) the initial inventory level or (2) the High Stocking Reference, whichever is greater. See Equation 6.7 and Equation 6.8 below.

The procedure for determining the *standardized adjusted baseline* depends on whether the *standardized unadjusted baseline* for aboveground standing live carbon stocks was determined as an average (i.e., according to Equation 6.5), or an upward sloping straight-line trend (i.e., according to Equation 6.6).

Where the *standardized unadjusted baseline* for aboveground standing live carbon stocks was determined using Equation 6.5:

Determining Common Practice

Common Practice refers to the average stocks of aboveground standing live and standing dead carbon associated with the Assessment Area(s) covered by the Project Area. The Common Practice statistic applicable to a project can be found by consulting the Assessment Area Data File on the Reserve's [FPP webpage](#). If the Project Area covers multiple Assessment Areas, Common Practice must be calculated as the average of the values for each Assessment Area, weighted by the percentage of the Project Area that falls within each Assessment Area.

Common Practice statistics are calculated from United States Forest Service Forest Inventory and Analysis (USFS FIA) program. The Reserve will update the Common Practice statistics in the Assessment Area Data File periodically. The frequency of updating Common Practice statistics will be subject to the availability of new USFS FIA data, but will be no more frequent than once every five years. The Reserve will announce any forthcoming updates to the Common Practice statistics before they are released, and any updates will not be retroactive.

Step 7 – Proportionally Adjust Other Reported Carbon Stocks

The *standardized adjusted baseline* for other reported carbon stocks must be determined by adjusting carbon stock values to reflect the *standardized adjusted baseline* for aboveground standing live and standing dead carbon stocks. The guidance for adjusting the other reported carbon stocks is shown in Table 6.2.

Table 6.2. Guidance for Adjusting Other Carbon Pools

Carbon Pool	Relationship to Adjustments of Aboveground Live Carbon Stocks	Adjustment
Belowground Standing Live Carbon Stocks	Directly Proportional	

compliance with the legal constraints. Project credits are determined by calculating the project's carbon stocks and subtracting the baseline stocks from them.

Using the Carbon Online Estimator (COLE¹⁷), select Forest Inventory and Analysis (FIA) plots using the “plots within this radius” tool. The circle developed must be centered within the Project Area. The radius of the sample area must be at least 100 kilometers. Following the guidance on the website, fetch the data within the circle. Next, filter the data using the ‘Filter’ tab on the website by selecting species in the ‘Forest Type’ menu bar that are found in the species list in the Assessment Area Data File for Assessment Area(s) the project is in. Click on the ‘Reports’ tab and submit the request to produce the 1605(b) report, which will be provided through a web interface. The report must be included as an appendix in the PDD.

Using Table 1 of the COLE 1605(b) report, the baseline for the project, barring any adjustments as part of the legal analysis (below), shall be determined by summing the live tree and dead tree values from the COLE 1605(b) report that correspond with the rotation length value found in Table 6.3. The 1605(b) values are given as metric tons of carbon per hectare and shall be converted into metric tons CO₂e per acre. The determination of rotation length is made using the Assessment Area Data File and identified for rotation length.

Table 6.3. Table Rotation Lengths

Rotation Length	Years
Short	30
Medium	40
Long	60
Extremely Long	70

6.2.2.1 Adjust for Legal Constraints

The baseline must exceed all legal constraints. A determination must be made whether the legal constraints that affect forest management within the Project Area require further adjustments to the initial baseline developed above, using the following steps:

1. Identify legal constraints affecting the Project Area.
 - a. Identify and describe the legal requirements affecting the Project Area.
 - b. Spatially identify (map) the areas to which the legal requirements apply within the Project Area to determine the affected acres.
2. Determine forest structure needed to comply with the legal requirements.
 - a. Describe the forest structure needed to ensure compliance with the legal requirements affecting each area.
 - b. Explain and justify the forest conditions and associated age class that meets the forest conditions identified for meeting the minimum criteria of the legal requirement. In no case shall the age class be less than the age class associated with the rotation length from Table 6.3.
3. Adjust baseline values
 - a. Use the live and dead tree values associated with the age class from the COLE 1605(b) report that is associated with the previous step. The 100-year values for

¹⁷ <http://www.ncasi2.org/COLE/>. After opening, zoom into project area on map and follow instructions to “get plots within this radius...”. Once the data has been retrieved, the report can be obtained following the instructions on the site.

Guidance. This will help streamline the sequential sampling process when recent disturbances have taken place.

4. Applying an appropriate confidence deduction for the inventory based on its statistical uncertainty, following the guidance in the Quantification Guidance.

6.2.5 Determining Actual Carbon in Harvested Wood Products

Perform the following steps to determine actual carbon in harvested wood products:

1. Determine the actual amount of carbon in standing live carbon stocks (prior to delivery to a mill) harvested in the current year (based on harvest volumes determined in Section 6.2.4).
2. Determine the amount of actual harvested carbon that will remain stored in wood products, averaged over 100 years, following the requirements in the Quantification Guidance.

6.2.6 Quantifying Secondary Effects

For Improved Forest Management Projects, significant Secondary Effects can occur if a project reduces harvesting in the Project Area, resulting in an increase in harvesting on other properties. Changes in energy-related emissions, which could result from a Forest Project causing consumers of forest products to increase or decrease their use of alternative materials, are not accounted for because it is assumed that energy sector emissions are accounted for by energy sector reporting.

The assumption under this protocol is that some Secondary Effects will occur because of project activities. However, the amount of Secondary Effects is dependent on how much harvesting occurs on the Project Area relative to the baseline scenario. Equation 6.10 must be used to estimate Secondary Effects for Improved Forest Management Projects. Per Equation 6.10, up to 80% of the difference between actual and baseline harvested carbon may be applied as Secondary Effects.

Recognizing that Secondary Effects from a project may be influenced by long term harvesting trends, the evaluation in Equation 6.10 considers cumulative harvest amounts since project inception. When less harvesting has occurred on the Project Area since project commencement relative to the amount harvested under the baseline scenario, the Secondary Effects value for the current reporting period may be either negative or positive, depending on how actual and baseline harvest amounts for the current reporting period compare. As a result, net GHG reductions for the reporting period are lowered when actual onsite harvested carbon for the year is less than the baseline amount.

When actual onsite harvested carbon during a reporting period is greater than the baseline amount, net GHG reductions are increased. This allows for deductions for prior negative Secondary Effects to be recouped. However, once actual cumulative harvest amounts exceed baseline cumulative harvest amounts, Secondary Effects are zero – under no circumstances shall the net balance of the Secondary Effects over the course of a project be positive.

Values used for onsite carbon harvested in the project and baseline scenarios ($AC_{hv,n}$ and $BC_{hv,n}$) shall represent all harvested trees, not just merchantable species.

- b. Documentation indicating that the Project Operator has obtained all necessary approvals from the governing county to convert the Project Area to the proposed type of non-forest land use (including, for instance, certificates of compliance, subdivision approvals, timber conversion permits, other rezoning, major or minor use permits, etc.).
 - c. Documentation indicating that similarly situated forestlands within the project's Assessment Area were recently able to obtain all necessary approvals from the governing county, state, or other governing agency to convert to a non-forest land use (including, for instance, certificates of compliance, subdivision approvals, timber conversion permits, other rezoning, major or minor use permits, etc.).
2. Estimating the rate of conversion and removal of onsite standing live and dead carbon stocks. The rate of conversion and removal of onsite standing live and dead carbon stocks must be estimated by either:
 - a. Referencing planning documentation that has been approved and permitted by the appropriate planning department for the Project Area (e.g., construction documents or plans) that specifies the timeframe of the conversion and intended removal of forest cover on the Project Area; or
 - b. In the absence of specific documentation, identifying a default annual conversion rate for carbon in standing live and dead carbon stocks from Table 6.4. The default value is subject to any legal constraints, which must be incorporated in modeling the project's baseline.

Table 6.4. Default Avoided Conversion Rates for Standing Live and Dead Carbon Stocks

Type of Conversion Identified in Appraisal	Total Conversion Impact	Annual Rate of Conversion
	This is the assumed total effect over time of the conversion activity on standing live and dead carbon stocks. (The total conversion impact is amortized over a 10-year period to determine the annual rate of conversion in the next column.)	This is the assumed annual rate of the conversion activity on standing live and dead carbon stocks. The percentages below are multiplied by the initial standing and dead carbon stocks for the project on an annual basis for the first 10 years of the project.
Residential	Estimate using the following formula: $TC\% = (\min(1, (P \times 3) / PA))$ Where, TC = % total conversion (TC cannot exceed 100%) PA = the Project Area (acres) identified in the appraisal P = the number of unique parcels that would be formed on the Project Area as identified in the appraisal * Each parcel is assumed to deforest 3 acres of forest vegetation	Estimate using the following formula: $ARC = TC / 10$ Where, ARC = % annual rate of conversion TC = % total conversion
Mining and Agricultural Conversion, including Pasture or Crops	90%	9.0%
Golf Course	80%	8.0%
Commercial Buildings	95%	9.5%

Table 6.5. Soil Carbon Emissions Estimators by Soil Order

Soil Order		<i>Alfisol</i>	<i>Andisol</i>	<i>Inceptisol</i>	<i>Mollisol</i>	<i>Spodosol</i>	<i>Ultisol</i>	<i>Histosol</i>
Estimated Emissions Associated with Conversion Activity	Agriculture	30%	30%	30%	30%	30%	30%	80%
	Residential/Commercial/Industrial	0%	0%	0%	0%	0%	0%	80%
Rate of Estimated Emissions		100% in first 10 years	100% in first 10 years	100% in first 10 years	100% in first 10 years	100% in first 10 years	100% in first 10 years	10% per 10-year period

A weighted estimate of emissions must be conducted where more than one soil order is found in the Project Area.

The baseline trend of soil carbon stocks must be graphed to display the soil carbon stocks on an annual basis. Annual soil carbon emissions are derived from the decadal soil carbon emissions by dividing by ten. Figure 6.4 displays the baseline trend of soil carbon using the example presented in Table 6.6.

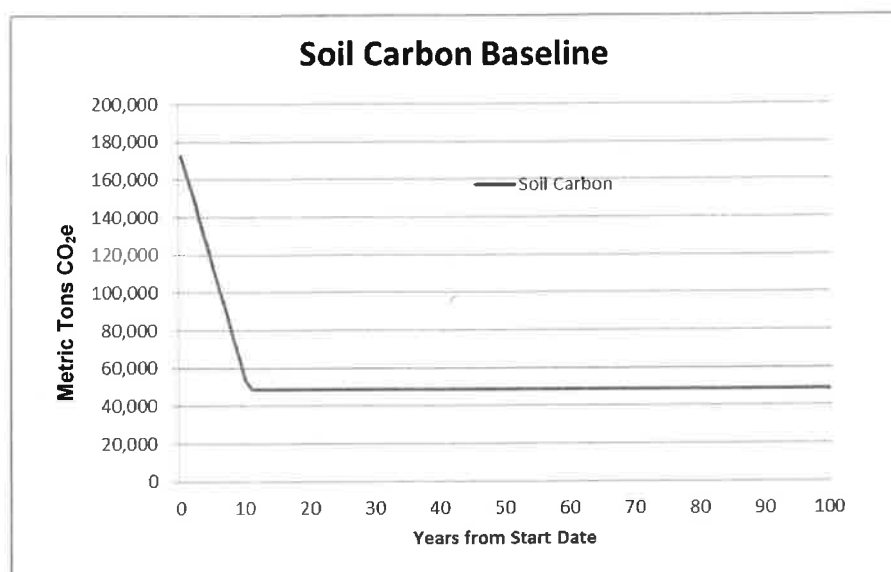


Figure 6.4. Example of an Avoided Conversion Project Baseline for Soil Carbon Stocks

The carbon stock trends for standing live carbon, standing dead carbon, and soil carbon are added together to determine a project baseline for the onsite carbon stocks. Figure 6.5 displays the baseline trend of soil carbon and standing live and dead carbon, using the example data provided above.

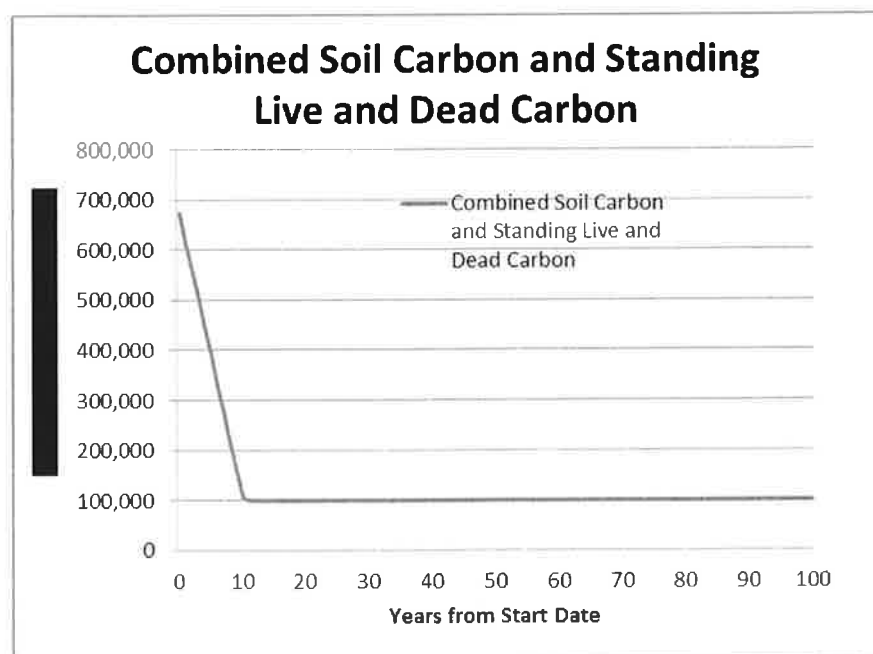


Figure 6.5. Example of an Avoided Conversion Project Baseline for the total Onsite Carbon Stocks

7.2.1 About the Buffer Pool

The Buffer Pool is a holding account for Forest Project CRTs, which is administered by the Reserve. All Forest Projects must contribute a percentage of CRTs to the Buffer Pool any time they are issued CRTs for verified GHG reductions and removals. Each Forest Project's contribution is determined by a project-specific risk rating, as described in Section 7.2.2. If a Forest Project experiences an unavoidable reversal of GHG reductions and removals (as defined in Section 7.3), the Reserve will retire a number of CRTs from the Buffer Pool equal to the total amount of carbon that was reversed (measured in metric tons of CO₂-equivalent). The Buffer Pool therefore acts as a general insurance mechanism against unavoidable reversals for all Forest Projects registered with the Reserve.

7.2.2 Contributions to the Buffer Pool

Each time the Reserve issues CRTs for verified GHG reductions and removals achieved by a Forest Project, a certain percentage of those CRTs must be contributed to the Buffer Pool. The size of the contribution to the Buffer Pool will depend on the Forest Project's risk rating for reversals. For example, if a Forest Project is issued ten CRTs after annual verification, and the project's reversal risk rating is ten percent, then nine CRTs will be issued to the Project Operator's Reserve account and 1 CRT must be deposited in the Buffer Pool.

Project Operators must determine the reversal risk rating for a project by following the requirements and guidance in Appendix A. The risk rating must be determined prior to registration, and recalculated in every year the project undergoes a verification site visit (see Section 9.3.2).

Project Operators who record a Qualified Conservation Easement or Qualified Deed Restriction in conjunction with implementing a Forest Project will receive a lower risk rating (see Appendix A).

Project Operators may be able to reduce the risk rating through actions that lower the risk profile of their project. If a Forest Project's risk rating declines, the Reserve may distribute previously withheld Buffer Pool CRTs to the Project Operator in proportion to the reduced risk. Similarly, however, the Reserve may require additional contributions to the Buffer Pool if the risk rating increases, to ensure that all CRTs (including those issued in prior years) are properly insured.

7.2.3 Other Insurance Options for Reversals

It is the Reserve's expectation that other options to insure against reversals will develop for projects in the future. These options may include direct insurance. Alternative insurance mechanisms could be used to directly reduce the required Buffer Pool contributions for a project. The Reserve must review and approve alternative insurance mechanisms before they may be used.

7.3 Compensating for Reversals

The Reserve requires that all reversals be compensated through the retirement of CRTs. If a reversal associated with a Forest Project was unavoidable (as defined below), then the Reserve will compensate for the reversal on the Project Operator's behalf by retiring CRTs from the Buffer Pool. If a reversal was avoidable (as defined below) then the Project Operator must compensate for the reversal by surrendering CRTs from its Reserve account.

- b. The retired CRTs must be designated in the Reserve's software system as compensating for the Avoidable Reversal.

7.4 Disposition of Forest Projects after a Reversal

If a reversal lowers the Forest Project's actual standing live carbon stocks below its approved baseline standing live carbon stocks, the Forest Project will automatically be terminated, as the original approved baseline for the project would no longer be valid. If the Forest Project is automatically terminated due to an Unavoidable Reversal, another project may be initiated and submitted to the Reserve for registration on the same Project Area. New projects may not be initiated on the same Project Area if the Forest Project is terminated due to an Avoidable Reversal.

If the Forest Project has experienced a reversal and its actual standing live carbon stocks are still above the approved baseline levels, it may continue without termination as long as the reversal has been compensated. The project must continue contributing to the Buffer Pool in future years based on its verified risk rating.

the requirements in Section 4.1. The Reserve will create a file of all verified forest carbon projects on Google Maps for public dissemination.

8.1.1 Forest Project Design Document

The forest Project Design Document (PDD) is a required document for reporting information about a project. The document is submitted at the initial verification. A PDD template has been prepared by the Reserve and is available on the Reserve's website. The template is arranged to assist in ensuring that all requirements of the FPP are addressed. The template is required to be used by all projects. The template is designed to manage the varying requirements based on project type.

Each project must submit a PDD at the project's first verification. The Project Operator must include a general description of the methodology that will be incorporated by the Project Operator to update their inventory estimates on an annual basis per guidance in the Quantification Guidance on the [FPP webpage](#) for the reported carbon pools.

PDDs are intended to serve as the main project document that thoroughly describes how the project meets eligibility requirements, discusses the quantification methodologies utilized to generate project estimates, outlines how the project complies with terms for additionality and describes methods for updating inventory estimates and how permanence will be addressed, including how project reversal risks are calculated. All methodologies used by Project Operators and descriptions in the PDD must be clear in a way that facilitates review by verifiers, Reserve staff, and the public. PDDs must be of professional quality and free of incorrect citations, missing pages, incorrect project references, etc.

8.2 Monitoring Report

Monitoring is the process of regularly collecting and reporting data related to a project's performance. Annual monitoring of Forest Projects is required to ensure up-to-date estimates of project carbon stocks and provide assurance that GHG reductions or removals achieved by a project have not been reversed. Project Operators must conduct monitoring activities and submit monitoring reports according to the schedule and requirements presented in Section 8.3. Monitoring is required for a period of 100 years following the final issuance of CRTs to a project for quantified GHG reductions or removals.

For Forest Projects, monitoring activities consist primarily of updating a project's forest carbon inventory, entering the updated inventory into the Forest Project's Calculation Worksheet, and submitting it to the Reserve at frequencies defined in Section 8.3. CRTs are only issued in years that the project data are verified, as described in Section 9.

A monitoring report must be prepared for each Reporting Period. Monitoring reports must be provided to verification bodies whenever a Forest Project undergoes verification. In addition, monitoring reports must be provided to the Reserve upon the completion of any Reporting Period for which verification will be deferred (e.g., if the Project Operator foregoes a desk-review verification). All monitoring reports are due within 12 months of the end of the Reporting Period. Monitoring reports must include an update of the project's calculation worksheet. The project's calculation worksheet includes:¹⁸

¹⁸ Reforestation Projects, as described in Section 6.1, can defer the items that are marked with an asterisk until the second site visit verification.

2. Any changes in the status of the Project Operator including, if applicable per Section 3.9.1, the acquisition of new forest landholdings.
3. If a reversal has occurred during the previous year, the report must provide a written description and explanation of the reversal, whether the Reserve classified the reversal as Avoidable or Unavoidable, and the status of compensation for the reversal.

8.3 Reporting and Verification Cycle

A Forest Project is considered automatically terminated (see Section 3.5) if the Project Operator chooses not to report data and undergo verification at required intervals.

8.3.1 Reporting Period Duration and Cycle

A Reporting Period is a discrete period of time for which a Project Operator quantifies and reports GHG reductions and removals, as well as required project data to the Reserve. The initial Reporting Period may cover any length of time, up to one year. Reporting Periods subsequent to the initial Reporting Period must cover 12 months of project activity. Harvested Wood Products should not be reported as of the project start date. Figure 8.1 displays the Reporting Periods in graphical form.

Reporting Periods must be contiguous, i.e., there must be no gaps in reporting during the crediting period of a Forest Project once the first reporting period has commenced.

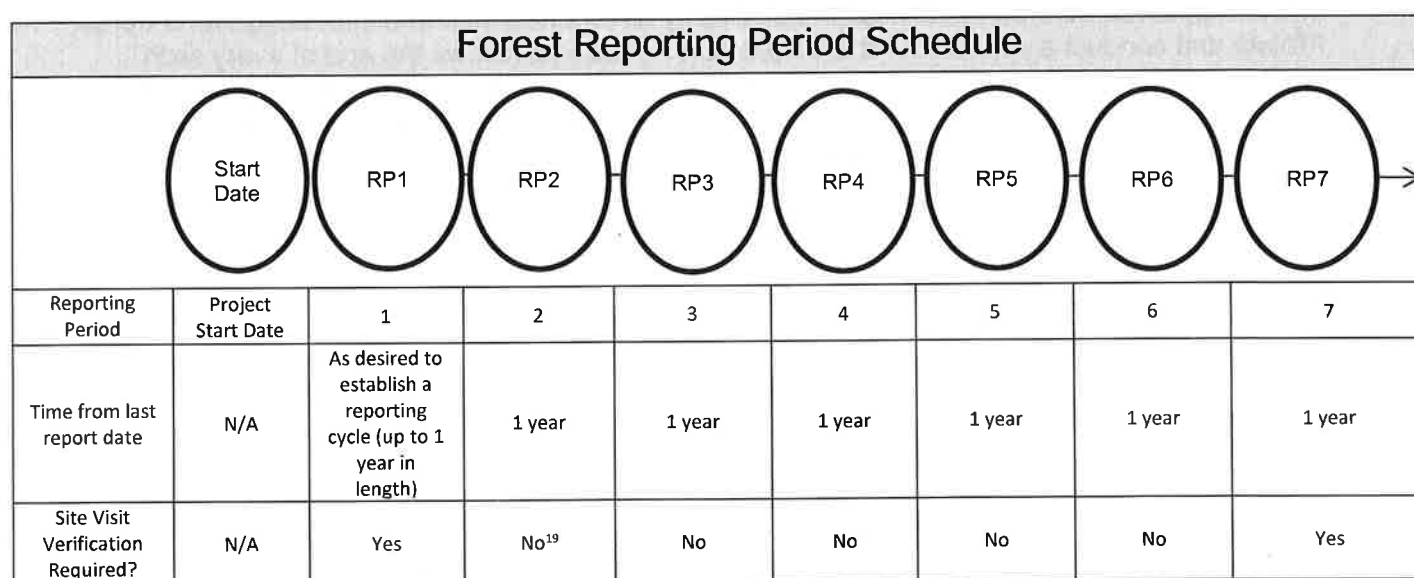


Figure 8.1. Forest Project Reporting Schedule

8.3.2 Verification Cycle

All Forest Projects must be initially verified within 30 months of being submitted to the Reserve. The initial verification of all project types must include a site visit, confirm the project's eligibility, and confirm that the project's initial inventory and the baseline have been established in conformance with the FPP. Subsequent verification may include multiple Reporting Periods and is referred to as the "Verification Period." The end date of any Verification Period must correspond to the end date of a Reporting Period.

¹⁹ A site visit verification may be required earlier, if the Project Operator chooses to establish a new confidence deduction or reversal risk rating.

random selection to the degree possible and still meet the six- and 12-year completion requirements. For example, in the case where there are ten projects that joined the aggregate in the first year, five of those projects should be chosen randomly and complete a site visit verification within 12 months following the sixth reporting period. The site visit verifications may be spread out through each six-year interval or scheduled in a more concentrated manner that economizes on verification expenses. Project Operators may be notified of a site visit verification prior to the year in which the verification is to take place.

The only exception is when a second site visit verification for a Reforestation Project is deferred for more than six reporting periods (see Section 6.1.1). In this case, the calculation of the percentages for meeting the six-year and 12-year minimums may be made by excluding the deferred Reforestation Projects from the totals. After the second site visit verification for a Reforestation Project, this exception is no longer allowed.

8.3.2.2 Desk Review Verification

Non-Aggregated Projects

In between site visit verifications, the Project Operator may choose to have an approved third-party verification body conduct a desk review of annual monitoring reports as an optional verification. CRTs may be issued for GHG reductions/removals verified through such desk reviews. Adjustments may not be made to inventory confidence deductions and/or risk ratings as part of the optional verification. Submission of annual monitoring reports to the Reserve is required even if the Project Operator chooses to forego desk review verification.

Desk review verifications are not permitted for Reforestation Projects between the initial and second site visit verifications if the Project Operator has opted to defer the second verification.

Aggregated Projects

Between site visit verifications, each Project Operator must submit annual project monitoring reports. Verification bodies must annually audit a sample of the annual monitoring reports, equivalent to the square root of the total number of participating projects in the aggregate, or the total number of participating projects divided by 12, whichever is higher (when rounded to the next highest whole number). As an example, an aggregate with 16 projects must have four project monitoring reports verified in a given year. Audited projects must be selected randomly, and must not include projects undergoing site visit verification for the year. Project Operators will not know when their annual monitoring reports will require verification. Since this is a random process, a Project Operator may have the annual report verified in consecutive years or when the project is verified with a required site visit.

Successful verification of a representative sample results in the crediting of all projects participating in the entire aggregate. If verification for a participating project is unsuccessful, the verification body must verify additional participating projects until the total number of successful verifications reaches the required number (as described above). If the required number of successful verifications has not been achieved within 12 months after the date the verification body submits a negative Verification Statement and Report to the Reserve for a project in the aggregate, crediting of all the participant projects in the aggregate will be suspended until the required number of successful verifications has been achieved. If material issues arise during verification of a participant project, the Project Operator will need to independently address the issues and required corrective actions using the same process taken with standalone projects.

9 Verification Guidance

This section provides guidance to Reserve-approved verification bodies for verifying GHG emission reductions associated with a planned set of activities to remove, reduce or prevent CO₂ emissions in the atmosphere by conserving and/or increasing forest carbon stocks.

This section supplements the Reserve's Verification Program Manual,²⁰ which provides verification bodies with the general requirements for a standardized approach for independent and rigorous verification of GHG emission reductions and removals. The Verification Program Manual outlines the verification process, requirements for conducting verification, conflict of interest and confidentiality provisions, core verification activities, content of the verification report, and dispute resolution processes. In addition, the Verification Program Manual explains the basic verification principles of ISO 14064-3:2006 which must be adhered to by the verification body.

Forest Project verification bodies must read and be familiar with the following International Organization for Standardization (ISO) and Reserve documents and reporting tools:

1. Forest Project Protocol (this document)
2. Reserve Program Manual
3. Reserve Verification Program Manual
4. Reserve software
5. ISO 14064-3:2006 Principles and Requirements for Verifying GHG Inventories and Projects

Only Reserve-approved Forest Project verification bodies are eligible to verify Forest Project reports. To become a recognized Forest Project verifier, verification bodies must become accredited under ISO 14065. Information on the accreditation process can be found on the Reserve website at <http://www.climateactionreserve.org/how/verification/how-to-become-a-verifier/>.

The verification of reports that reference carbon stocks must be conducted with the oversight of a Professional Forester, for jurisdictions with a Professional Forester law or regulation, or a Certified Forester,²¹ managed by the Society of American Foresters, so that professional standards and project quality are maintained. Any Professional Forester or Certified Forester verifying a project in an unfamiliar jurisdiction must consult with a Professional Forester or Certified Forester practicing forestry in that jurisdiction to understand all laws and regulations that govern forest practice within the jurisdiction. The Reserve may evaluate and approve alternative certification credentials if requested, but only for jurisdictions where professional forester laws or regulations do not exist.

9.1 Standard of Verification

The Reserve's standard of verification for Forest Projects is the Forest Project Protocol (FPP), the Reserve Program Manual, and the Reserve Verification Program Manual. To verify a land owner's initial Forest Project Design Document and annual monitoring reports, verification

²⁰ Found on the Reserve website at <http://www.climateactionreserve.org/how/program/program-manual/>.

²¹ See www.certifiedforester.org.

Table 9.1C. Initial Eligibility Verification Items – Avoided Conversion Projects

Verification Items		Section of FPP	Apply Professional Judgment?
1. Project Definition	<p>a. Proof that the project is/was on private land prior to project initiation.</p> <p>b. Proof that a conservation easement was recorded, or the land was transferred to public ownership.</p> <p>c. Demonstration that conversion out of forest is a significant risk (following the requirements of Section 6.3.1 – see also Table 9.1H).</p> <p>d. No evidence exists for use of broadcast fertilization.</p>	2.1.3, 6.3.1	Yes (for 1.c and 1.d)
2. Legal Requirement Test	<p>a. Proof that a signed Attestation of Voluntary Implementation form is on file with the Reserve.</p> <p>b. Documentation has been provided that demonstrates that the type of land use conversion anticipated by the project is legally permissible; documentation must fall into at least one of the three categories specified in Section 3.3.1.3.</p>	3.3.1.3	No
3. Performance Test	Copy of real estate appraisal for the Project Area indicating conformance to criteria in Section 3.3.2.3.	3.3.2.3	No
4. Start Date	Identification of date on which a conservation easement that dedicates the Project Area to continuous forest cover was recorded or the Project Area was transferred to public ownership.	3.2, 3.7	No
5. Project Implementation Agreement	Proof that a Project Implementation Agreement (PIA) between the Project Operator and the Reserve has been signed and recorded in the county of interest.	3.6	No
6. Project Location	<p>a. Project is located in the United States of America.</p> <p>b. Project is on private land, or</p> <p>c. If non-federal public lands, provide documentation showing approval by the government agency or agencies responsible, or</p> <p>d. If tribal land, provide documentation that demonstrates that the land within the Project Area is owned by a tribe or private entities.</p>	3.1	No

9.3.1.2 Project Area Definition

Verification bodies are required to review the geographic boundaries defining the Project Area and their compliance with the requirements outlined in Section 4 of this protocol. These items are verified only at the project's initiation.

Table 9.1F. Baseline Modeling Verification Items – Improved Forest Management Projects – Private Lands

Verification Items		Section of FPP	Apply Professional Judgment?
1. Inventory of Onsite Carbon Stocks	An inventory of the Project Area's carbon stocks in required and optional pools has been conducted in accordance with the requirements and the <u>Quantification Guidance</u> (see Section 9.3.5 for further verification guidance).	6.2.1, <u>Quantification Guidance</u>	Yes
2. Compare Initial Aboveground Standing Live Carbon Stocks with the Minimum Baseline Level	a. The baseline analysis utilizes the correct value for Common Practice and the Minimum Baseline Level (for aboveground standing live carbon stocks) associated with the Assessment Area(s) covered the Project Area. b. Initial aboveground standing live carbon stocks have been estimated correctly following the requirements and the <u>Quantification Guidance</u> .	6.2.1, Determining Common Practice on the <u>Assessment Area Data webpage, Quantification Guidance</u>	No
3. Baseline Carbon Stock Modeling	A 100-year forest management simulation of standing live carbon stocks has been conducted in accordance with the requirements and guidance in Section 6.2.1 and the <u>Quantification Guidance</u> (see Section 9.3.7 for further verification guidance).	6.2.1, <u>Quantification Guidance</u>	Yes
4. Description of Forest Project Activities	A description has been provided of the management activities that will lead to increased carbon stocks in the Project Area compared to the baseline.	2	No

Table 9.1G. Baseline Modeling Verification Items – Improved Forest Management Projects – Public Lands

Verification Items		Section of FPP	Apply Professional Judgment?
1. Initial Forest Carbon Stock Inventory	An inventory of the Project Area's carbon stocks in required and optional pools has been conducted in accordance with the requirements and the <u>Quantification Guidance</u> (see Section 9.3.5 for further verification guidance).	6.2.2, <u>Quantification Guidance</u>	Yes
2. Baseline Carbon Stock Modeling	A 100-year forest management simulation of standing live carbon stocks has been conducted per the requirements in Section 6.2.2 and the <u>Quantification Guidance</u> (see Section 9.3.7 for further verification guidance).	6.2.2, <u>Quantification Guidance</u>	Yes
3. Description of Forest Project Activities	A description has been provided of the management activities that will lead to increased carbon stocks in the Project Area compared to the baseline.	2	No

	guidance of Section 6.1.2 and the Quantification Guidance (see Section 9.3.8 for further verification guidance).		
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Table 9.1J. Baseline Carbon in Wood Products Verification Items – Improved Forest Management Projects

Verification Items		Section of FPP	Apply Professional Judgment?
1. Baseline Harvest Volume	The average volume of harvesting in each year of the baseline over 100 years has been derived from the growth and harvesting regime used to develop the baseline for onsite carbon stocks, following the requirements and guidance in Section 6.2.1 or 6.2.2, Section 6.2.3, the Quantification Guidance (see Section 9.3.8 for further verification guidance).	6.2.1, 6.2.2, 6.2.3, Quantification Guidance	No
2. Long-Term Storage in Wood Products	The average amount of carbon expected to be transferred to wood products each year and stored over the long-term (100 years) has been calculated following the requirements and guidance of Section 6.2.3 and the Quantification Guidance (see Section 9.3.8 for further verification guidance).	6.2.3, Quantification Guidance	No

Table 9.1K. Baseline Carbon in Wood Products Verification Items – Avoided Conversion Projects

Verification Items		Section of FPP	Apply Professional Judgment?
1. Baseline Harvest Volume	The volume of harvesting in each year of the baseline over 100 years has been derived from the harvesting regime assumed for the baseline for onsite carbon stocks, following the requirements and guidance in Section 6.3.2, the Quantification Guidance (see Section 9.3.8 for further verification guidance).	6.3.2, Quantification Guidance	No
2. Long-Term Storage in Wood Products	The amount of harvested wood that would be delivered to mills in each year has been determined, and the amount of carbon expected to be transferred to wood products each year and stored over the long-term (100 years) has been calculated following the requirements and guidance of Section 6.3.2 and the Quantification Guidance (see Section 9.3.8 for further verification guidance).	6.3.2, Quantification Guidance	No

9.3.2 Site Visit Verification

Site visit verification involves review of the Forest Project's carbon stock inventory estimates, relevant attestations, soil carbon emissions associated with management activities, risk of reversal ratings, and compliance with Natural Forest Management criteria. After a Forest Project's initial verification, subsequent site visits must assess and ensure accuracy in measurement and monitoring techniques and onsite record keeping practices.

Verification Items		Section of FPP	Apply Professional Judgment?
9. Estimates of Actual Carbon in Harvested Wood Products	The amount of harvested wood that has been delivered to mills over the reporting period has been determined correctly, and the amount of carbon expected to be transferred to wood products and stored over the long-term (100 years) has been calculated correctly, per the requirements in Section 6 and the requirements and the <u>Quantification Guidance</u> (see Section 9.3.8 for further verification guidance).	6.1.4, 6.2.5, 6.3.4, <u>Quantification Guidance</u>	No
10. Quantification of Primary Effect	Calculations for the Primary Effect are complete and accurate for both onsite carbon stocks and harvested wood products.	6	No
11. Quantification of Secondary Effects	Calculations for quantifying Secondary Effects are complete and accurate.	6.1.5, 6.2.6, 6.3.5	No
12. Reversal Determination	If a reversal has occurred, the type of reversal (avoidable or unavoidable) has been properly identified.	7.3	Yes
13. Reversal Risk Rating	Project's risk rating has been calculated following the requirements of Appendix A	Appendix A	No

9.3.3 Desk Review Verification

For reporting periods in between required site visits, project verification activities may consist of a desk review. During a desk review, the verification body will review the data in annual monitoring reports to check calculations and information for reasonability, accuracy, and completeness.

Table 9.3. Desk Review Verification Items

Verification Items		Section of FPP	Apply Professional Judgment?
1. Attestation of Title	Proof that a signed Attestation of Title is on file at the Reserve for the dates of the verification period. In addition to reviewing this form, the verification body must conduct a review to confirm ownership and claims to GHG reductions/removals that have occurred over the verification period.	3.7	Yes
2. Attestation of Regulatory Compliance	Proof that a signed Attestation of Regulatory Compliance form is on file with the Reserve for the reporting period. In addition to reviewing this form, the verification body must perform a risk-based assessment to confirm the statements	3.8	Yes

Project Protocol webpage. Forest project carbon stock inventories (requirements for which are contained in the Quantification Guidance) should be used as the basis of these assessments where applicable. Forest projects that do not initially meet Natural Forest Management criteria but can demonstrate progress towards meeting these criteria within the required timelines are eligible to register and maintain that registration with the Reserve.

Table 9.4. Natural Forest Management Verification Items

Verification Items		Apply Professional Judgment?
1. Native Species	Completed inventory demonstrates that project consists of at least 95% native species. Must demonstrate continuous progress toward goal and criterion must be met within 50 years.	Yes
2. Composition of Native Species	<p>a. Reforestation Projects: Documentation on planted mixture of species combined with natural regeneration meets composition of native species goals. Project must show continuous progress and criteria must be met within 50 years, unless an exception has been made through a letter from the State Forester as described in Section 3.9.</p> <p>b. Improved Forest Management and Avoided Conversion Projects: Completed inventory demonstrates distribution of average basal area of standing live tree species meets composition of native species goal. Project is not eligible unless it is demonstrated that management activities will enable this goal to be achieved over the project life or an exception has been made through a letter from the State Forester as described in Section 3.9.</p>	Yes
3. Sustainability of Timber Resource	<p>a. Documentation showing that the forest, including entity lands outside Project Area, is currently under one of the following:</p> <ul style="list-style-type: none"> i. Third party certification under the Forest Stewardship Council or Sustainable Forestry Initiative/ Tree Farm System, or ii. A renewable long-term management plan sanctioned and monitored by a state or federal agency within a Reserve-approved Assessment Areas, or iii. For Project Operators and their affiliates that own 5,000 acres or less, uneven-aged silvicultural practices (if harvesting occurs) and canopy retention averaging at least 40% across the entire forestland owned by the Project Operator in the same Assessment Areas covered by the Project Area, as measured on any 20 acres within the Project Operator's landholdings found in any of these Assessment Areas, including land within and outside of the Project Area (areas impacted by Significant Disturbance may be excluded from this test), or iv. Possessing a deeded conservation easement(s) that contain terms that ensure growth equals or exceeds harvest over time. Verifiers should make a reasonable attempt to contact the steward of the conservation easement to confirm compliance. <p>b. Completed inventory demonstrates the project maintains, or makes progress toward maintaining, no more than 40% of forested acres in ages less than 20 years. Project must show continuous progress and this criterion must be met within 25 years.</p>	Yes
4. Structural Elements (Lying and Standing Dead Wood)	Completed inventory work demonstrates that lying and standing dead wood is retained in sufficient quantities and for sufficient duration depending on whether portions of the Project Area have undergone salvage harvesting.	Yes

updating an inventory may also occur by assigning a 'best-fit' tree list that represents the stand conditions to the plots that were affected by disturbance. This solution is a shorter term solution since the plots used to estimate the inventory have been affected.

During all site visit verifications (following the initial site visit verification in cases where the project start date is the same year as the initial site visit verification), the Project Operator must provide a map(s) that displays areas where disturbance has occurred. For stratified inventories, a pre-disturbance map must display the vegetation stratum prior to the disturbance and a post-disturbance map must display the vegetation stratum following the disturbance. For non-stratified inventories, the disturbance map must display the underlying plots, if any, affected by the disturbance. For stratified inventories, a summary tree list associated with the updated vegetation strata shall be provided. For non-stratified inventories, tree lists shall be provided for each plot affected by disturbance.

During site verification, verifiers shall randomly select a minimum of 10% of the vegetation polygons (strata polygons) or plots updated for disturbance, and determine if the assigned tree lists do not obviously overestimate the carbon associated with the forest structure remaining after the disturbance. Where plots are updated through assignment of a tree list (instead of assigning a vegetation stratum) following the disturbance, the verifier shall ensure all plots have been updated and the updated tree list is consistent with the forest structure remaining after disturbance. For non-stratified inventories, it is not acceptable for a Project Operator to simply remove disturbed plots from the inventory. The plots must be assigned a tree list to estimate the post-disturbance condition. It is acceptable to remove plots from an inventory that is strata-based upon disturbance that affects the plots.

Tree lists resulting from stratification or assignment are determined to be inconsistent if the tree list would result in carbon stocks substantially above what in the verifier's professional judgment would associate with the post-disturbance condition. The determination for consistency can be made through an office review by comparing the assigned tree lists with the disturbance events. A verifier can choose to enhance their review for consistency by visiting disturbed sites in the field.

To minimize the risk of inaccuracies to the inventory, no more than 10% of the plots used to characterize the project's inventory can be developed from estimated tree lists without increased scrutiny from verification. The plots assigned an estimated tree list must be appropriately coded in the inventory database so that they can be queried and isolated. Plots assigned with an estimated tree list are not to be used in sequential sampling efforts unless the number of plots with estimated tree lists exceeds 10%, in which case all plots, measured or estimated, must be available for random selection for sequential sampling during verification.

- be too small to be included, per sampling methodology criteria, at the time of the Project Operator measurement. Per the Quantification Guidance, inventory estimates developed by the Project Operator must include all trees 5 inches DBH and larger.
- c. Additionally, the Quantification Guidance permits Project Operators to develop an inventory methodology with varying plot areas that are expanded on a per acre basis depending on the size of the plots and with varying DBH requirements for which trees are included in each plot. In such cases, trees that were determined to be too small to be included in a larger plot by the Project Owner, may have grown and now exceed the minimum threshold for inclusion in the larger plot.
 - d. To account for this limited growth, the verifier shall not include trees in the verifier measurements (for sequential sampling purposes) if the tree was omitted by the Forest Owner and the tree diameters, at time of verification audit, are less than 7 inches DBH. Similarly, trees that were included by the Forest Owner in a plot with a certain expansion factor and, at the time of verifier audit, have not exceeded the threshold for being switched to a plot with a different expansion factor by more than 10%, shall continue to be entered in the plot determined by the Project Operator, such that the expansion values are consistent for the Project Operator and the verifier.
 - i. This applies a reasonable cushion to Project Operators who apply the sampling methodology correctly, but through no fault of their own would otherwise be penalized due to forest growth changing measurement parameters. It should be noted that the cushion is minimal and will not relieve Project Operators from growth over long periods of time that would exceed these allowances. Hence, Project Operators need to base the re-measurement of the plots on an adequate timeframe to avoid verification problems with their inventory data.
 - ii. Any trees that do not meet the criteria of the standards listed above shall be included as part of the verifier's plot estimate for purposes of sequential sampling.
6. Verifiers shall insert their own determination of species for each tree included in the verifier's inventory.
7. For defect and decay, verifiers may first consider the inputs of the Forest Owner and determine whether or not they were reasonable. If considered reasonable, the verifier may insert the same classification as the Forest Owner for each tree included in the verifier's inventory. If, however, not considered reasonable, or not recorded by the Forest Owner, the verifier shall insert their own determination.

9.3.5.4 Verifying a Stratified Inventory

Where the Project Operator's inventory is stratified, the strata to be verified may be selected by the verifier according to the presumed risk of measurement error or presumed risk of the effects of measurement error on the overall inventory estimate, as described above. Individual stands and/or plots must be independently selected using a random selection design. The verifier shall select three strata (or the maximum number of strata present) based on the verifier's evaluation of risk. The minimum number of passing plots is six consecutive passing plots, or the first passing plot after a minimum of twelve plots are measured.

- 4) If H_0 was rejected then additional samples may be taken as long as the verifier is of the opinion that there is a chance that H_0 may be accepted based on the variability and trend observed.

Unpaired Plots

The statistical test is based on comparing the average CO₂e estimates for each stratum from the verifier plots to the Project Operator plots.

Use $\alpha=0.05$ to control for error; the β is not specified because we are constructing a confidence interval not a test. The null hypothesis (H_0) is that the verification and stratum averages are equal. The following procedure is appropriate for the unpaired test.

- 1) Perform verification sampling on at least the minimum number of plots required in a sequence from Section 9.3.5.5. Calculate n as the sum of the number of plots from both the stratum and the verification.
- 2) Calculate the following:

$$T_n =$$

that provides the greatest efficiency while sampling in the field, but when the verifier inputs data into the spreadsheet, the verifier must follow the random selection order in order to properly conduct the analysis and maintain the integrity of sequential analysis. This may provide significant efficiencies when selected stands and/or plots are in close geographic proximity and it is hypothesized that the stopping rules will require the full number of plots. Table 9.7 displays a hypothetical sampling schedule planned by the verifier and the hypothetical verification results. In this case, the sequential sampling is conditionally satisfied after Day 3 but requires the full set of randomly selected stands to be sampled up to the point of satisfying the sequential statistics, which is met after sampling Stand 3 on Day 4.

The statistical test is based on a comparison of the verifier's measurements of plots, calculated as CO₂e per acre compared to the Forest Owner's measurements of plots, which may include any adjustments for growth. The inventory verification is complete when the first plot passes after a minimum of 12 plots are measured, or when a minimum of 6 plots are identified as 'passing' in sequence in the Sequential Sampling Tool for plot CO₂e per acre (paired) or when the first plot passes after a minimum of 30 plots are measured (unpaired). Passing of the plot height and/or diameters (DBH) is not required to pass the inventory verification; however, as discussed above, verifiers may separately compare their measurements for height and diameter with the Forest Owner's measurements in the sequential sampling tool. When 6 consecutive plots are identified as 'passing' for either height or diameter, that input is then considered to have met sequential sampling requirements and verifiers may use the data provided for each tree from the Forest Owner's database for any additional data inputs needed for the CO₂e/acre comparison.

2. Biomass Equations and Calculations	<p>a. The carbon tonnes per acre for a representative sample plot, computed using the Project Operator's calculation tools, replicate output computed by the verification body.**</p> <p>b. All conversions and expansions are accurate.</p>	Yes
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*A forest biometrician employed by the state in which the project is located, or a consulting forest biometrician may be consulted in the event of a dispute between the verification body and Project Operator. The written opinion of the forest biometrician, submitted to the Reserve as part of the verification report, shall be considered the authoritative word.

**The verification body must provide an (idealized) 'verification plot' consisting of all tree species in Project Area with varying heights and diameters existing within the Project Area. The plot need not correspond to an actual plot within the Project Area.

9.3.7 Baseline Modeling

To determine a Forest Project's baseline, computer models are used to project the Project Area's initial inventory of carbon stocks into the future under a set of constraints prescribed by this protocol (Section 6). Modeling must include assumptions about forest growth and harvest, as influenced by legal and financial constraints, and assumptions regarding the extent of harvest operations under Business As Usual conditions.

Verification bodies are required to verify the baseline estimate for the project at the initial site visit verification for Improved Forest Management Projects and Avoided Conversion Projects. Reforestation baselines may be verified at the second site visit verification.

Baseline modeling must incorporate initial inventory estimates and forecast how carbon stocks will change over the Forest Project's crediting period.

All reports that reference carbon stocks must be submitted by the Project Operator with the oversight of a Professional Forester. If the project is located in a jurisdiction without a Professional Forester law or regulation, then Certified Forester credentials managed by the Society of American Foresters (see <http://www.certifiedforester.org>) are required so that professional standards and project quality are maintained.

Table 9.9. Baseline Modeling Verification Items

Verification Items		Section of FPP	Apply Professional Judgment?
1. Document	A modeling document exists that contains all the verification items in this table.	9	No
2. Qualitative Characterization (Reforestation and Avoided Conversion Projects Only)	A sufficiently detailed qualitative characterization has been included in the modeling document that documents the general assumptions of the project's baseline. The qualitative assessment addresses the vegetative conditions and activities that would have occurred.	6.1, 6.3	Yes

9.3.8 Verifying Estimates of Carbon in Harvested Wood Products

Verification bodies are required to verify the estimates of carbon that are likely to remain stored in wood products over a 100-year period, as submitted in the Forest Project Design Document (for baseline estimates) and annual monitoring reports (for actual wood product production). Accounting for wood product carbon must be applied only to actual or baseline volumes of wood harvested from within the Project Area. Trees harvested outside of the Project Area are not part of the Forest Project and must be excluded from any calculations.

Table 9.10. Carbon in Harvested Wood Products Verification Items

Verification Items		Section of FPP	Apply Professional Judgment?
1. Carbon in Harvested Wood Delivered to Mills	a. Amount of wood harvested that will be delivered to mills has been estimated and reported. b. The appropriate wood density factor has been applied and/or water weight subtracted to result in pounds of biomass with zero moisture content. c. Total dry weights for all harvested wood have been calculated. d. Total carbon weight has been computed. e. The total has been converted to metric tons of carbon.	<u>Quantification Guidance</u>	No
2. Account for Mill Efficiencies	The correct mill efficiency factors have been used to calculate total carbon transferred into wood products.	<u>Quantification Guidance</u>	No
3. Wood Product Classification	The percentages of harvest by wood product class has been determined correctly with verified reports from the mill(s) where the Project Area's logs are sold; or by looking up default wood product classes for the project's Assessment Area(s); or if not available from either of these sources, by classifying all wood products as "miscellaneous."	<u>Quantification Guidance</u>	No
4. Calculation of In-Use and Landfill Carbon Storage	a. The average amount of carbon stored in in-use wood products over 100 years has been calculated correctly using the worksheets in the <u>Quantification Guidance</u> . b. The average amount of carbon stored in landfilled wood products over 100 years has been calculated correctly using the worksheets in the <u>Quantification Guidance</u> .	<u>Quantification Guidance</u>	No
5. Total Average Carbon Storage in Wood Products Over 100 Years	Total average carbon storage in wood products over 100 years for a given harvest volume has been calculated and reported.	<u>Quantification Guidance</u>	No

can be corrected. If so, the verification body and Project Operator should schedule a second set of verification activities after the Project Operator has revised the project submission.

6. If a reasonable level of assurance opinion is successfully obtained, upload electronic copies of the Verification Report, List of Findings, Verification Statement, and Verification Activity Log into the Reserve.
7. Return important records and documents to the Project Operator for retention.

The recommended content for the Verification Report, List of Findings, and Verification Statement can be found in the Reserve's Verification Program Manual.²³ The Verification Program Manual also provides further guidance on quality assurance, negative verification statements, use of an optional Project Verification Activity Log, goals for exit meetings, dispute resolution, and record keeping.

²³ Available at <http://www.climateactionreserve.org/how/program/program-manual/>.

	for biomass. Maps of the Assessment Areas and the associated data may be found on the Reserve's website.
Avoidable Reversal	An avoidable reversal is any reversal that is due to the Project Operator's negligence, gross negligence, or willful intent, including harvesting, development, and harm to the Project Area
Avoided Conversion Project	A type of Forest Project consisting of specific actions that prevent the conversion of forestland to a non-forestland use by dedicating the land to continuous forest cover through a conservation easement or transfer to public ownership.
Baseline	The level of GHG emissions, removals, and/or carbon stocks at sources, sinks or reservoirs affected by a Forest Project that would have occurred under a Business As Usual scenario. For the purposes of this protocol, a project's baseline must be estimated following standard procedures in Section 6.
Best Management Practices	Management practices determined by a state or designated planning agency to be the most effective and practicable means (including technological, economic, and institutional considerations) of controlling point and nonpoint source pollutants at levels compatible with environmental quality goals. ²⁴
Biological Emissions	For the purposes of the Forest Project Protocol, biological emissions are GHG emissions that are released directly from forest biomass, both live and dead, including forest soils. For Forest Projects, biological emissions are deemed to occur when the reported tonnage of onsite carbon stocks, relative to baseline levels, declines from one year to the next.
Biomass	The total mass of living organisms in a given area or volume; recently dead plant material is often included as dead biomass. ²⁵
Bole	A trunk or main stem of a tree.
Broadcast Fertilization	A fertilizer application technique where fertilizer is spread across the soil surface.
Buffer Pool	The buffer pool is a holding account for Forest Project CRTs administered by the Reserve. It is used as a general insurance mechanism against unavoidable reversals for all Forest Projects registered with the Reserve. If a Forest Project experiences an unavoidable reversal of GHG reductions and removals (as defined in Section 7.3), the Reserve will retire a number of CRTs from the buffer pool equal to the total amount of carbon that was reversed (measured in metric tons of CO ₂ -equivalent).

²⁴ Helms. (1998).

²⁵ Metz, Davidson, Swart, & Pan. (2001).

Forest Project	A planned set of activities designed to increase removals of CO ₂ from the atmosphere, or reduce or prevent emissions of CO ₂ to the atmosphere, through increasing and/or conserving forest carbon stocks.
Forest Project Design Document	A standard document for reporting required information about a Forest Project. The Forest Project Design Document must be submitted for review by a verification body and approved by the Reserve before the Forest Project can be registered with the Reserve.
Forestland	Land that supports, or can support, at least ten percent tree canopy cover and that allows for management of one or more forest resources, including timber, fish and wildlife, biodiversity, water quality, recreation, aesthetics, and other public benefits.
GHG Assessment Boundary	The GHG Assessment Boundary defines all the GHG sources, sinks, and reservoirs that must be accounted for in quantifying a Forest Project's GHG reductions and removals (Section 6). The GHG Assessment Boundary encompasses all the GHG sources, sinks, and reservoirs that may be significantly affected by Forest Project activities, including forest carbon stocks, sources of biological CO ₂ emissions, and mobile combustion GHG emissions.
GHG Reductions and Removals	See definitions for Reduction and Removal.
Greenhouse Gas (GHG)	Gas that contributes to global warming and climate change. For the purposes of this Forest Project Protocol, GHGs are the six gases identified in the Kyoto Protocol: carbon dioxide (CO ₂), nitrous oxide (N ₂ O), methane (CH ₄), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF ₆).
Improved Forest Management Project	A type of Forest Project involving management activities that increase carbon stocks on forested land relative to baseline levels of carbon stocks.
Listed	A Forest Project is considered "listed" when the Project Operator has created an account with the Reserve, submitted the required Project Submittal form and other required documents, paid the project submission fee, and the Reserve has approved and accepted the project for listing.
Litter	Any piece(s) of dead woody material from a tree, e.g., dead boles, limbs, and large root masses, on the ground in forest stands that is smaller than material identified as lying dead wood.
Lying Dead Wood	Any piece(s) of dead woody material from a tree, e.g., dead boles, limbs, and large root masses, on the ground in forest stands. Lying dead wood is all dead tree material with a minimum average diameter of five inches and a minimum

Project Life	Refers to the duration of a Forest Project and its associated monitoring and verification activities, as defined in Section 3.5.
Public Lands	Lands that are owned by a public governmental body such as a municipality, county, state or country.
Project Operator	A Forest Owner responsible for undertaking a Forest Project and registering it with the Reserve. The Forest Owner who executes the Project Implementation Agreement, as described in Section 2.2.
Qualified Conservation Easement	A qualified conservation easement must explicitly refer to the terms and conditions of the Project Implementation Agreement, apply to current and all subsequent Project Operators for the full duration of the Forest Project's minimum time commitment, as defined in Section 3.5 of this protocol.
Qualified Deed Restriction	A qualified deed restriction shall ensure that the Project Implementation Agreement runs with the land and applies to all current and subsequent Project Operators for the full duration of the Forest Project's minimum time commitment, as defined in Section 3.4 of this protocol, to be determined in the Reserve's reasonable discretion. A deed restriction is not "qualified" if it merely consists of a recording of the Project Implementation Agreement or a notice of the Project Implementation Agreement, as such a recording is already required by the Project Implementation Agreement.
Reduction	The avoidance or prevention of an emission of CO ₂ (or other GHG). Reductions are calculated as gains in carbon stocks over time relative to a Forest Project's baseline (also see Removal).
Reforestation Project	A type of Forest Project involving the restoration of tree cover on land that currently has no, or minimal, tree cover.
Registered	A Forest Project becomes registered with the Reserve when it has been verified by a Reserve-approved and ISO-accredited verification body, all required documentation (see Section 8) has been submitted by the Project Operator to the Reserve for final approval, and the Reserve approves the project.
Removal	Sequestration ("removal") of CO ₂ from the atmosphere caused by a Forest Project. Removals are calculated as gains in carbon stocks over time relative to a Forest Project's baseline (also see Reduction).
Reporting Period	The period of time over which a Project Operator quantifies and reports GHG reductions and removals.
Reservoir	Physical unit or component of the biosphere, geosphere or hydrosphere with the capacity to store or accumulate

	submitted to the Reserve's software system, and the Project Operator has paid a project submission fee.
Tree	A woody perennial plant, typically large and with a well-defined stem or stems carrying a more or less definite crown with the capacity to attain a minimum diameter at breast height of five inches and a minimum height of 15 feet with no branches within three feet from the ground at maturity. ²⁷
Unavoidable Reversal	An unavoidable reversal is any reversal not due to the Project Operator's negligence, gross negligence or willful intent, including wildfires or disease that are not the result of the Project Operator's negligence, gross negligence or willful intent.
Uneven-Aged Management	Management that leads to forest stand conditions where the trees differ markedly in their ages, with trees of three or more distinct age classes either mixed or in small groups.
Verification	The process of reviewing and assessing all of a Forest Project's reported data and information by an ISO-accredited and Reserve-approved verification body, to confirm that the Project Operator has adhered to the requirements of this protocol.
Verification Period	The period of time over which GHG reductions/removals are verified. A verification period may cover multiple reporting periods. The end date of any verification period must correspond to the end date of a reporting period.

²⁷ Helms. (1998).

Risk Category	Risk Type	Description	How Risk is Managed in this Protocol
	Disease/Insects	Loss of project carbon through disease and/or insects	Default Risk
	Other Episodic Catastrophic Events	Loss of project carbon from wind, snow and ice, or flooding events	Default Risk

A.1 Financial Risk

Financial failure of an organization resulting in bankruptcy can lead to dissolution of agreements and forest management activities to recover losses that result in reversals. Projects that employ a Qualified Conservation Easement or Qualified Deed Restriction, or that occur on public lands, are at a lower risk than projects with a PIA alone.

Table A.2. Financial Failure Leading to Bankruptcy

Applies to all projects		
Identification of Risk	Contribution to Reversal Risk Rating	
Default Financial Risk	PIA only	PIA combined with Qualified Conservation Easement or Qualified Deed Restriction or on public lands
	5%	1%

Table A.3. PIA Subordination

Applies to all projects		
Identification of Risk	Contribution to Reversal Risk Rating	
Default Financial Risk	PIA with "Subordination Clause Type II"	PIA with "Subordination Clause Type I"
	10%	2%

A.2 Management Risk

Management failure is the risk of management activities that directly or indirectly could lead to a reversal. Projects that employ a conservation easement or deed restriction, or that occur on public lands, are exempt from this risk category.

Management Risk I – Illegal Removals of Forest Biomass

Illegal logging occurs when biomass is removed either by trespass or outside of a planned set of management activities that are controlled by regulation. Illegal logging is exacerbated by lack of controls and enforcement activities.

Table A.7. Social Risk Identification

Applies to all projects	
Identification of Risk	Contribution to Reversal Risk Rating
United States Default Social Risk	2%

A.4 Natural Disturbance Risk

Natural disturbances can pose a significant risk to the permanency GHG reductions and removals. Natural disturbance risks are only partially controllable by management activities. Management activities that improve resiliency to wildfire, insects, and disease can reduce these risks. Management activities that shift harvesting practices from live sequestering trees to trees that have succumbed to natural disturbances reduce or negate the reversal depending on the size and location of the disturbance.

Natural Disturbance Risk I – Wildfire

A wildfire has the potential to cause significant reversals, especially in certain carbon pools. These risks can be reduced by certain techniques including reducing surface fuel loads, removing ladder fuels, adding fuel breaks, and reducing stand density. However, these techniques cannot reduce emission risk to zero because all landowners will not undertake fuel treatments, nor can they prevent wildfire from occurring.

Table A.8. Natural Disturbance Risk I – Wildfire

Applies to all projects	
Identification of Risk	Contribution to Reversal Risk Rating
Refer to the Assessment Area Data File for the project's risk rating	X%
If fuel treatments have been implemented for the Project Area, reduce the value above by the appropriate percent as indicated below.*	(X%) x Y%

* Depending on the level of fuel treatments the Y% is set as follows: project is actively implementing comprehensive fuel management plan, or implements a combination of fuel breaks in strategic areas and thinning from below across at least 30% of the project area = 50%, silviculture across at least 30% of the project area consists largely of thinning from below = 66.3%, project has installed fuel breaks in strategic areas = 82.6%, no fuel treatments = 100%.

Natural Disturbance Risk II – Disease or Insect Outbreak

A disease or insect outbreak has the potential to cause a reversal, especially in certain carbon pools.

Completing the Risk Rating Analysis

The project's reversal risk rating is calculated as follows:

$$100\% - \left((1 - \text{FinancialFailure}\%) \times (1 - \text{IllegalForestBiomassRemoval}\%) \times (1 - \text{Conversion}\%) \right. \\ \left. \times (1 - \text{OverHarvesting}\%) \times (1 - \text{SocialRisk}\%) \times (1 - \text{Wildfire}\%) \times (1 - \text{Disease/InsectOutbreak}\%) \right. \\ \left. \times (1 - \text{OtherCatastrophicEvents}\%) \right)$$

Table B.1. Determination of Reforestation Project Eligibility

Site Preparation Costs	Value of Harvested Products	Rotation Age (Years)	Site Class	Eligibility	Scenario #
High Site Preparation	High	<60	Higher	Not Eligible	1
			Lower	Not Eligible	2
		>=60	Higher	Eligible	3
			Lower	Eligible	4
	Medium	<50	Higher	Not Eligible	5
			Lower	Not Eligible	6
		50 - 59	Higher	Not Eligible	7
			Lower	Eligible	8
		>=60	Higher	Eligible	9
			Lower	Eligible	10
	Low	<30	Higher	Not Eligible	11
			Lower	Eligible	12
		>=30	Higher	Eligible	13
			Lower	Eligible	14
	Very Low	>=30	Higher	Eligible	15
			Lower	Eligible	16
Low Site Preparation	High	<60	Higher	Not Eligible	17
			Lower	Not Eligible	18
		60 - 69	Higher	Not Eligible	19
			Lower	Eligible	20
		>=70	Higher	Eligible	21
			Lower	Eligible	22
	Medium	<50	Higher	Not Eligible	23
			Lower	Not Eligible	24
		50 - 59	Higher	Not Eligible	25
			Lower	Eligible	26
		>=60	Higher	Eligible	27
			Lower	Eligible	28
	Low	< 30	Higher	Not Eligible	29
			Lower	Not Eligible	30
		30 - 49	Higher	Not Eligible	31
			Lower	Eligible	32
		>=50	Higher	Eligible	33
			Lower	Eligible	34
	Very Low	>=30	Higher	Eligible	35
			Lower	Eligible	36
		<30	Higher	Not Eligible	37
			Lower	Not Eligible	38

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1 Introduction

The Urban Tree Planting (UTP) Project Protocol provides requirements and guidance for quantifying the net climate benefits of activities that sequester carbon in woody biomass within an urban environment. The protocol provides project eligibility rules, methods to calculate a project's net effects on greenhouse gas (GHG) emissions and removals of carbon dioxide (CO₂) from the atmosphere ("removals"), procedures for assessing the risk that carbon sequestered by a project may be reversed (i.e. released back to the atmosphere), and approaches for long term project monitoring and reporting.

The goal of this protocol is to ensure that the net GHG reductions and removals caused by a project are accounted for in a complete, consistent, transparent, accurate, and conservative manner¹ and may therefore be reported to the Climate Action Reserve (Reserve) as the basis for issuing carbon offset credits (called Climate Reserve Tonnes, or CRTs). Additionally, it is the goal of the Reserve to ensure the protocol is as efficient and practical as possible for Project Operators.

As the premier carbon offset registry for the North American carbon market, the Reserve encourages action to reduce GHG emissions by ensuring the environmental integrity and financial benefit of emission reduction projects. The Reserve establishes high quality standards for carbon offset projects, oversees independent third-party verification bodies, issues carbon credits generated from such projects, and tracks the transaction of credits over time in a transparent, publicly-accessible system. The Reserve is a private 501(c)(3) nonprofit organization based in Los Angeles, California.²

Only projects that are eligible under and comply with the UTP Project Protocol may be registered with the Reserve. Section 8 of this protocol provides requirements and guidance for verifying the performance of project activities and their associated GHG reductions and removals reported to the Reserve.

1.1 About Urban Forests, Carbon Dioxide and Climate Change

Urban forests have the capacity to both emit and absorb CO₂, a leading greenhouse gas that contributes to climate change. Trees, through the process of photosynthesis, naturally absorb CO₂ from the atmosphere and store the gas as carbon in their biomass, i.e. trunk (bole), leaves, branches, and roots. Carbon may also be stored in the soils that support the urban forest, as well as the understory plants and litter on the urban forest floor. After trees are removed, their wood residue may be converted into mulch, with CO₂ gradually released to the atmosphere through decomposition. Carbon may continue to be sequestered for a substantial amount of time in wood products and in landfills. Carbon from urban forests may also be used to provide fuel for biomass energy. Urban trees can reduce summertime air temperatures and building energy use for air conditioning, thus reducing GHG emissions from electricity generation (Akbari 2002). In winter, trees can increase or decrease GHG emissions associated with energy consumed for space heating, depending on local climate, site features, and building characteristics (Heisler 1986).

¹ See the WRI/WBCSD GHG Protocol for Project Accounting (Part I, Chapter 4) for a description of GHG reduction project accounting principles.

² For more information, please visit www.climateactionreserve.org.

2 Urban Tree Planting Definition and Requirements

For the purposes of this protocol, an Urban Tree Planting (UTP) Project is a planned set of activities designed to increase removals of CO₂ from the atmosphere, or reduce or prevent emissions of CO₂ to the atmosphere, through increasing and/or conserving urban forest carbon stocks.

A glossary of terms used in this protocol is provided in Section 9. Throughout the protocol, important defined terms are capitalized (e.g. "Urban Forest Owner").

2.1 Project Definition

A UTP Project is a project where new trees are planted in areas where trees have not been harvested with a primary commercial interest during the 10 years prior to the Project Commencement Date. Only planted trees and trees that regenerate from planted trees are eligible to be quantified for credits. Benefits from urban tree planting activities occur when the net CO₂e (CO₂e stored minus CO₂e emitted) associated with planted trees exceeds baseline tree planting CO₂e levels.

2.2 Urban Forest Owners

Credits for a UTP Project must be quantified from carbon that is owned by participating entities. An Urban Forest Owner is a corporation, a legally constituted entity (such as a utility or special district), city, county, state agency, educational campus, individual(s), or a combination thereof that has legal control of any amount of urban forest carbon³ within the Project Area.

Control of urban forest carbon means the Urban Forest Owner has the legal authority to effect changes to urban forest carbon quantities (right to plant or remove, for example). Control of urban forest carbon occurs, for purposes of satisfying this protocol, through fee ownership, perpetual contractual agreements, and/or deeded encumbrances. This protocol recognizes the fee owner as the default owner of urban forest carbon where no explicit legal encumbrance exists. Individuals or entities holding mineral, gas, oil, or similar *de minimis*⁴ interests without fee ownership are precluded from the definition of Urban Forest Owner.

2.3 Project Operators

A Project Operator must be one of the Urban Forest Owners or a legally created entity to represent the Urban Forest Owners. The Project Operator is responsible for undertaking a UTP Project and registering it with the Reserve, and is ultimately responsible for all project listing, monitoring, reporting, and verification. The Project Operator is responsible for any reversals associated with the project and is the entity that executes the Project Implementation Agreement (see below) with the Reserve.

In all cases where multiple Urban Forest Owners participate in a UTP Project, the Project Operator must secure an agreement from all other Urban Forest Owners that assigns authority to the Project Operator to include the carbon they own in the project, subject to any conditions imposed by any of the Urban Forest Owners to include or disallow any carbon they control and any provisions to opt out of the project.

³ See definition of Carbon Stock in the glossary.

⁴ *de minimis* control includes access right of ways and residential power line right of ways.

3 Eligibility Rules

In addition to the definitions and requirements described in Section 2, projects must meet several other criteria and conditions to be eligible for registration with the Reserve, and must adhere to the following requirements related to their duration and crediting periods.

3.1 Project Location

Only those activities that occur within the Urban Area boundaries, defined by the most recent publication of the United States Census Bureau (<http://www.census.gov/geo/maps-data/maps.html>), are eligible to develop a project under this protocol. Projects must be entirely within the Urban Area boundary as of Project Commencement.

3.2 Project Area

The Project Area is the geographic extent of the UTP Project. The Project Area may be made up of consolidated or disaggregated polygons. A KML file must be submitted with the project to clearly identify the project boundaries. There are no size limits for UTP Projects.

No part of the Project Area can be included if commercial harvesting of timber has occurred in the Project Area in the past 10 years. Additionally, the issuance and transaction of credits will be suspended if commercial harvesting of timber products occurs any time during the project. Where the harvesting of commercial timber products is anticipated, the OPO should consider the use of a protocol that addresses the carbon stored in harvested wood products, such as the Reserve's Forest Protocol or the California Air Resource's Board Compliance Forest Protocol. Exceptions to the prohibition of harvesting commercial timber products are recognized where the provision of commercial timber products might be generated where harvests are conducted primarily for safety, salvage of material when trees are in decline, and developing improved resilience to wildfire and pests.

3.3 Project Commencement

The commencement date for a project is the date at which the Project Operator initiates an activity that will lead to increased GHG reductions or removals with long-term security relative to the project baseline. The earliest acceptable activity that demonstrates the commencement of project activities is a formal planning process by the Project Operator. Subsequent activities to planning, including the purchase of equipment for tree planting, site preparation, or planting trees, with a plan in place, also demonstrate a project has commenced. Once a UTP Project has commenced, new plantings can occur within the Project Area throughout the Project Life. Discrete and verifiable evidence that acceptable activity has occurred includes signed contracts and/or direct evidence of the recent activity.

To be eligible, the project must be submitted to the Reserve no more than six months after the project commencement date.⁵ Projects may always be submitted for listing by the Reserve prior to their start date.

3.4 Additionality

The Reserve will only register projects that yield surplus GHG emission reductions and removals that are additional to what would have occurred in the absence of a carbon offset

⁵ Projects are considered submitted when the project developer has completed and uploaded the appropriate project submittal forms to the Reserve software.

3.7 Social and Environmental and Co-Benefits

All projects will provide climate benefits to the extent in which they generate credits. Urban forests provide many additional benefits, including environmental, social, and public health benefits. The ability to achieve additional environmental and social co-benefits depends on consideration of additional factors, some of which are described in this section. Only those projects where public and/or tribal entities participate in direct urban tree management activities (e.g., planting, tree distribution, etc.) are required to include the provisions for social and environmental co-benefits. However, these provisions may serve as suggestions to NGOs and other privately funded projects that may wish to enhance social and environmental co-benefits. Where required, the provisions must be described in the Project Design Document (PDD) and implemented throughout the Project Life. The Reserve has developed a tree-planting template that outlines elements that need to be addressed and provides important considerations that may be helpful in decision-making.⁷ The template provides considerations that will enable verifiers to ensure progress is being achieved over time.

3.7.1 Social Co-Benefits

UTP Projects can create long-term climate benefits as well as providing other social and environmental benefits. Investment in projects has the potential to improve the quality of life for urban communities in a number of ways. Among other benefits, tree planting projects can improve air quality and reduce storm water runoff, provide shade, and increase property values by creating a more aesthetically pleasing environment. Projects also have the potential to create negative social externalities such as an uneven distribution of project benefits due to an uneven distribution of projects sites throughout a community (e.g. skewed toward more affluent communities).

Table 3.1. Social Co-Benefits of Urban Tree Planting Projects

Social Provisions	Elements to Include in the Project Design Document (PDD)
Equitable distribution of forest resources	Describe how the project will make progress toward achieving relatively equal distribution of tree canopy cover by neighborhood whenever possible.
Public participation	Establish guidelines to ensure adequate notification, opportunities for public participation, and documentation with regards to public activities with urban forest management.

3.7.2 Environmental Co-Benefits

The protocol has a goal of permanently removing greenhouse gases from the atmosphere by sustaining carbon benefits generated from urban forests for at least 100 years. Healthy urban forests can also provide a number of environmental benefits as well as create negative externalities. Projects have the potential to improve air quality and reduce storm water runoff and energy usage. They can also contribute to reduced biodiversity, introduce invasive species, and damage infrastructure. Inefficient water usage during maintenance can also put pressure on local and regional water supplies.

⁷ Available at <http://www.climateactionreserve.org/how/protocols/urban-forest/>.

4 GHG Assessment Boundaries

The quantification of all included sources, sinks, and reservoirs (SSR) (Table 4.1 below) is described in the supplemental Quantification Guidance available on the Reserve's website.⁸

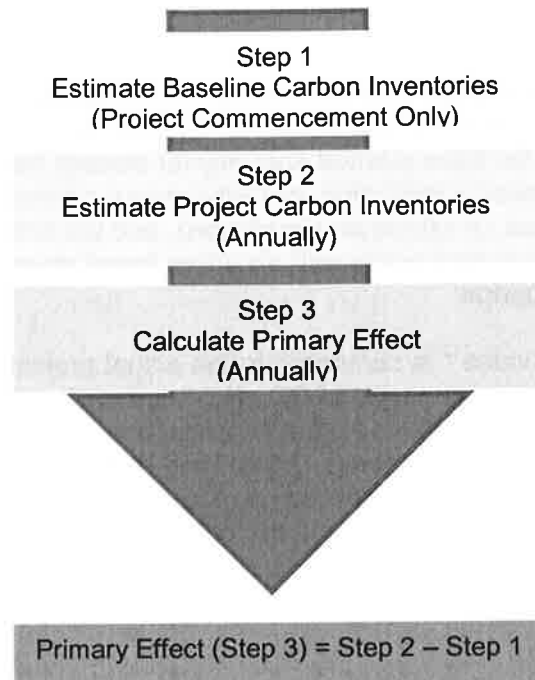
Table 4.1. Description of all Sources, Sinks, and Reservoirs

SSR	Source Description	Type	Gas	Included (I) or Excluded (E)	Justification/Explanation
UF-1	Standing live carbon (carbon in all portions of living trees)	Reservoir / Pool	CO ₂	Included	Increases in standing live carbon stocks are likely to be a large Primary Effect of UTP Projects
UF-2	Shrubs and herbaceous understory carbon	Reservoir / Pool	CO ₂	Excluded	For crediting purposes shrubs and herbaceous understory are excluded since changes in this reservoir are unlikely to have a significant effect on total quantified GHG reductions or removals. Furthermore, it is generally not practical to undertake measurements of shrubs and herbaceous understory accurate enough for crediting purposes.
UF-3	Standing dead carbon (carbon in all portions of dead, standing trees)	Reservoir / Pool	CO ₂	Included	Standing dead wood is expected to be a small, but in rare cases substantial, portion of UTP Projects.
UF-4	Lying dead wood carbon	Reservoir / Pool	CO ₂	Excluded	For crediting purposes lying dead wood carbon is excluded since changes in this reservoir are unlikely to have a significant effect on total quantified GHG reductions or removals. Changes associated with carbon projects are likely to increase lying dead wood. Furthermore, it is generally not practical to undertake measurements of lying dead wood accurate enough for crediting purposes.
UF-5	Litter and duff carbon (carbon in dead plant material)	Reservoir / Pool	CO ₂	Excluded	Litter and duff carbon is excluded since changes in this reservoir are unlikely to have a significant effect on total quantified GHG reductions or removals. Furthermore, it is generally not practical to undertake measurements of litter and duff accurate enough for crediting purposes.

⁸ <http://www.climateactionreserve.org/how/protocols/urban-forest/>

SSR	Source Description	Type	Gas	Included (I) or Excluded (E)	Justification/Explanation
			N ₂ O	Excluded	N ₂ O emissions from mobile combustion associated with ongoing project operation and maintenance activities are not considered significant.
UF-13	Stationary combustion emissions from ongoing project operation and maintenance	Source	CO ₂	Excluded	Stationary combustion CO ₂ emissions from ongoing project operation and maintenance could include GHG emissions associated with electricity consumption or heating/cooling at Urban Forest Owner facilities or at facilities owned or controlled by contractors. These emissions are unlikely to be significantly different from baseline levels, and are therefore not included in the GHG Assessment Boundary.
			CH ₄	Excluded	CH ₄ emissions from stationary combustion associated with ongoing project operation and maintenance activities are not considered significant.
			N ₂ O	Excluded	N ₂ O emissions from stationary combustion associated with ongoing project operation and maintenance activities are not considered significant.

The required formula for quantifying annual net GHG reductions and removals is presented in Equation 5.1. Net GHG reductions and removals must be quantified and reported in units of carbon dioxide-equivalent (CO₂e) metric tons.



Equation 5.1. Annual Net GHG Reductions and Removals

$$QR_y = (\Delta AC_{\text{onsite}} - \Delta BC_{\text{onsite}})$$

Where,

Units

QR_y = Quantified GHG reductions and removals for year y

tCO₂e

$\Delta AC_{\text{onsite}}$ = $(AC_{\text{onsite}, y} - AC_{\text{onsite}, y-1})$

tCO₂e

Where,

$AC_{\text{onsite}, y}$ = Actual carbon (CO₂e) as inventoried for year y (y may be less than a year for the first Reporting Period following Project Commencement).

tCO₂e

$AC_{\text{onsite}, y-1}$ = Actual carbon (CO₂e) as inventoried for year y-1

tCO₂e

$\Delta BC_{\text{onsite}}$ = $(BC_{\text{onsite}, y} - BC_{\text{onsite}, y-1})$

tCO₂e

Where,

$BC_{\text{onsite}, y}$ = Baseline onsite carbon (CO₂e) as estimated for year y (y may be less than a year for the first Reporting Period following Project Commencement).

tCO₂e

$BC_{\text{onsite}, y-1}$ = Baseline onsite carbon (CO₂e) as estimated for year y-1

tCO₂e

6 Ensuring the Permanence of Credited GHG Reductions and Removals

Changes in urban forest management have the potential to enhance the rate of CO₂ absorption, providing removals, and reducing or eliminating emissions associated with the loss of trees (reductions). Reductions are not possible with UTP Projects. The Reserve requires that credited GHG reductions and removals be effectively “permanent.” For UTP Projects, this requirement is met by ensuring that the carbon associated with credited GHG reductions and removals remains stored for at least 100 years.

The Reserve ensures the permanence of GHG reductions and removals through three mechanisms:

1. The requirement for all Project Operators to monitor onsite carbon stocks, submit regular monitoring reports, and submit to regular third-party verification of those reports along with periodic onsite verifications for the duration of the Project Life.
2. The requirement for all Project Operators to sign a Project Implementation Agreement with the Reserve which obligates Project Operators to retire CRTs to compensate for reversals of GHG reductions and removals.
3. The maintenance of a Buffer Pool to provide insurance against reversals of GHG reductions and removals due to unavoidable causes (including natural disturbances such as fires, pest infestations or disease outbreaks).

GHG reductions and removals can be “reversed” if the stored carbon associated with them is released (back) to the atmosphere. Many biological and non-biological agents, both natural and human-induced, can cause reversals. Some of these agents cannot completely be controlled (and are therefore “unavoidable”), such as natural agents like fire, insects, pathogens, drought, and wind.

Other agents can be controlled, such as the human activities like land conversion. Under this protocol, reversals due to controllable agents are considered “avoidable”. As described in this section, Project Operators must contribute to the Reserve Buffer Pool to insure against reversals. If the quantified GHG reductions and removals in a given year are negative, and CRTs were issued to the UTP Project in any previous year, the Reserve will consider this to be a reversal regardless of the cause of the decrease.

The Buffer Pool is a holding account for project CRTs, which is administered by the Reserve. All UTP Projects must contribute a percentage of CRTs to a Buffer Pool any time they are issued CRTs for verified GHG reductions and removals. A project that has an Unavoidable Reversal will use Buffer Pool CRTs proportionally from all projects that have contributed to the pool to compensate for the reversal. Project Operators do not receive compensation for their contributions to the Buffer Pool.

If a project experiences an Unavoidable Reversal of GHG reductions and removals (as defined in Section 6.2.2), the Reserve will retire a number of CRTs from the Buffer Pool equal to the total amount of carbon that was reversed (measured in metric tons of CO₂). The Buffer Pool therefore acts as a general insurance mechanism against Unavoidable Reversals for all UTP Projects registered with the Reserve. The Reserve may determine to re-distribute CRTs to Project Operators in the future, or modify the amount of contributions to the Buffer Pool, if actual Unavoidable Reversals fluctuate significantly from the current evaluation of risks.

If the Reserve determines that there has been an Unavoidable Reversal, it will retire a quantity of CRTs from the Buffer Pool equal to size of the reversal in CO₂-equivalent metric tons.

6.3 Disposition of Projects after a Reversal

If a reversal lowers the UTP Project's carbon stocks below its approved baseline carbon stocks, the project will be terminated as the original baseline approved for the project would no longer be valid. If a project is terminated due to an Unavoidable Reversal, a new project may be initiated and submitted to the Reserve for registration on the same Project Area. New projects may not be initiated on the same Project Area if the project is terminated due to an Avoidable Reversal.

Reserve. The Reserve will create a file of all verified forest carbon projects on Google Maps for public dissemination.

7.1.1 Urban Forest Project Design Document

The Project Design Document (PDD) is a required document for reporting information about a project. The document is submitted at the initial verification. A PDD template has been prepared by the Reserve and is available on the Reserve's website.¹⁴ The template is arranged to assist in ensuring that all requirements of the UTP Project Protocol are addressed. The template is required to be used by all projects. The template is designed to manage the varying requirements based on project type.

Each project must submit a PDD at the project's first verification. PDDs are intended to serve as the main project document that thoroughly describes how the project meets eligibility requirements, discusses summaries associated with developing data according to quantification requirements, outlines how the project complies with terms for additionality and describes how project reversal risks are calculated. All methodologies used by Project Operators and descriptions in the PDD must be clear in a way that facilitates review by verifiers, Reserve staff, and the public. PDDs must be of professional quality and free of incorrect citations, missing pages, incorrect project references, etc.

7.2 Monitoring Report

Monitoring is the process of regularly collecting and reporting data related to a project's performance. Annual monitoring of UTP Projects is required to ensure up-to-date estimates of project carbon stocks and provide assurance that GHG reductions or removals achieved by a project have not been reversed. Project Operators must conduct monitoring activities and submit monitoring reports according to the schedule and requirements presented in Section 7.2. Monitoring is required for a period of 100 years following the final issuance of CRTs to a project for quantified GHG reductions or removals.

Monitoring activities consist primarily of updating a project's forest carbon inventory, entering the updated inventory into the project's calculation worksheet, and submitting it to the Reserve at frequencies defined in Section 7.3. CRTs are only issued in years that the project data are verified, as described in Section 7.4.

A monitoring report must be prepared for each Reporting Period. Monitoring reports must be provided to verification bodies whenever a project undergoes verification. The monitoring report must be completed and submitted to the Reserve within 12 months of the end of the Reporting Period. When required verifications must be conducted as explained below, both the verification report and the monitoring report must be completed and submitted to the Reserve within 12 months of the end of the Reporting Period. Monitoring reports must include an update of the project's calculation worksheet. The project's calculation worksheet includes:

1. An updated estimate of the current year's carbon stocks in the reported carbon pools. Acceptable methodologies for updating the project's inventory are provided in the Quantification Guidance. The update is determined by:
 - a. Including any new forest inventory data obtained during the Reporting Period.
 - b. Applying growth estimates to existing inventory.

¹⁴ <http://www.climateactionreserve.org/how/protocols/urban-forest/>

Project Onsite Carbon Stocks	Yes	Yes		Yes		Yes
CRTs Issued upon Successful Verification?	No	Yes		Yes		Yes

Figure 7.1. Urban Tree Planting Reporting Periods

7.3.2 Verification Cycles

All projects must be initially verified within 30 months of being submitted to the Reserve. The initial verification of all project types must include a site visit, confirm the project's eligibility, and confirm that the project's initial inventory and the baseline have been established in conformance with the UTP Project Protocol. Subsequent verification may include multiple Reporting Periods and is referred to as the "Verification Period." The end date of any Verification Period must correspond to the end date of a Reporting Period.

Verification has both required frequencies and optional frequencies. Required verification is established on a temporal framework to ensure that ongoing monitoring of urban forest carbon stocks are accurate and up-to-date. Optional verification is at the Project Operator's discretion and may be conducted in the years in which verification is not required and the Project Operator wishes to receive credits. Required verifications are referred to as onsite verifications. Optional verifications are referred to as desk review verifications. Details of verification scheduling requirements are provided within this section.

Verification must be completed within 12 months of the end of the Reporting Period(s) being verified. For required verifications, failure to complete verification within the 12 month time period will result in account activities being suspended until the verification is complete. The project will terminate if the required verification is not completed within 36 months of the end of the Reporting Period(s) being verified. There is no consequence for failure to complete verification activities within 12 months for optional verifications.

7.3.3 Requirements of Onsite Verifications

Onsite verification is a verification in which project inventory data are verified through a process that audits data in the office as well as data in the field. The Reserve requires that an approved third-party verification body verify all reported data and information for a project and conduct a site visit for the Verification Period that coincides with Project Commencement and the end of every fifth Reporting Period following the Project Commencement Date. Buffer Pool contributions are also verified during onsite verifications.

7.3.4 Desk Review Verification

In between onsite verifications, the Project Operator may choose to have an approved third-party verification body conduct a desk review of annual monitoring reports as an optional verification. CRTs may be issued for GHG reductions/removals verified through such desk reviews.

Submission of annual monitoring reports to the Reserve is required even if the Project Operator chooses to forego desk review verification.

8 Verification Guidance

This section provides guidance to Reserve-approved verification bodies for verifying GHG emission reductions associated with urban forest projects.

This section supplements the Reserve's Verification Program Manual,¹⁵ which provides verification bodies with the general requirements for a standardized approach for independent and rigorous verification of GHG emission reductions and removals. The Verification Program Manual outlines the verification process, requirements for conducting verification, conflict of interest and confidentiality provisions, core verification activities, content of the verification report, and dispute resolution processes. In addition, the Verification Program Manual explains the basic verification principles of ISO 14064-3:2006 which must be adhered to by the verification body.

Verification bodies must read and be familiar with the following International Organization for Standardization (ISO) and Reserve documents and reporting tools:

- Urban Tree Planting Project Protocol (this document)
- Reserve Program Manual
- Reserve Verification Program Manual
- Reserve software
- ISO 14064-3:2006 Principles and Requirements for Verifying GHG Inventories and Projects

Only Reserve-approved urban forest project verification bodies are eligible to verify UTP Project reports. To become a recognized urban forest project verifier, verification bodies must become accredited under ISO 14065. Information on the accreditation process can be found on the Reserve website at <http://www.climateactionreserve.org/how/verification/how-to-become-a-verifier/>.

The verification of reports that reference carbon stocks must be conducted with the oversight of a Certified Arborist, a Professional Forester, or a Certified Forester,¹⁶ managed by the Society of American Foresters, so that professional standards and project quality are maintained. Any Certified Arborist, Professional Forester or Certified Forester who is not currently working with urban forest activities within the Project Area must consult with a Certified Arborist, a Professional Forester, Certified Forester, or planning agency familiar with the practice of urban forestry in that jurisdiction to understand all laws and regulations that govern urban forest practice within the jurisdiction. The Reserve may evaluate and approve alternative professional credentialing requirements if requested, but only for jurisdictions where laws or regulations that govern professional urban forest management do not exist.

8.1 Standard of Verification

The Reserve's standard of verification for UTP Projects is the Urban Tree Planting Project Protocol, the Reserve Program Manual, and the Reserve Verification Program Manual. To verify a Project Operator's initial Project Design Document and annual monitoring reports, verification bodies apply the verification guidance in the Reserve's Verification Program Manual and this

¹⁵ Found on the Reserve website at <http://www.climateactionreserve.org/how/program/program-manual/>.

¹⁶ See www.certifiedforester.org.

Table 8.1 displays the protocol sections that are verified at the initial verification, the onsite verification, and/or the optional annual verification.

Table 8.1. Verification Items and Related Schedules

Verification Items	Section of UTP Project Protocol	Initial	Site	Optional	Apply Professional Judgment ¹⁷ ?
1. Project Definition	2.1 Urban Tree Planting	X			Yes
2. Urban Forest Owner	2.2 Urban Forest Owners	X	X		Yes
3. Project Operator	2.3 Project Operators	X	X		No
4. Project Implementation Agreement	2.4 Project Implementation Agreement	X	X	X	No
5. Project Location	3.1 Project Location	X			No
6. Project Area	3.2 Project Area	X			No
8. Project Commencement	3.3 Project Commencement	X			Yes
9. Additionality	3.4.1 Legal Requirement Test	X	X		Yes
	3.4.2 Performance Test				
	3.4.2.1 Performance Standard for Urban Tree Planting Projects	X			
10. Project Crediting Period	3.5 Project Crediting Period	X	X		No
11. Minimum Time Commitment	3.6 Minimum Time Commitment	X	X		No
12. Social and Environmental Co-Benefits	3.7 Social and Environmental Co-Benefits	X	X		Yes for public entities only
13. Social Co-Benefits	3.7.1 Social Co-Benefits	X	X		Yes for public entities only
14. Environmental Co-Benefits	3.7.2 Environmental Co-Benefits	X	X		Yes for public entities only
15. GHG Assessment Boundaries	4 GHG Assessment Boundaries	X	X		No
The verification topics below are linked to quantification requirements. The verification of project inventories is described in detail below this table. Verifiers shall assure that requirements associated with the references in this table have been satisfied and implement the specific guidance requirements for verifying inventories below.					
16. Quantifying Net GHG Reductions and Removals	5 Quantifying Net GHG Reductions and Removals 8.3 Verifying Carbon Inventories Urban Tree Planting Quantification Guidance	X	X	X	No
17. Urban Forest Protocol Baselines	5.1 Urban Tree Planting Baseline Urban Tree Planting Quantification Guidance: Baseline Development for Urban Tree Planting Projects	X			No
18. Permanence and Buffer Pool Contributions	6.1 Contributions to the Buffer Pool	X	X		No
19. Permanence and Compensating for Reversals	6.2 Compensating for Reversals	X	X	X	No
	6.2.1 Avoidable Reversals				
	6.2.2 Unavoidable Reversals				

¹⁷ Verifiers must use professional judgment to verify protocol criteria which are not quantitative or can be measured completely with objective analysis.

Verification using the sequential sampling methodology requires the verification body to sequentially sample successive plots. Sequential approaches have stopping rules rather than fixed sample sizes. Verification is successful after a minimum number of successive plots in a sequence indicate agreement according to the tolerance thresholds established in the sequential sampling workbook. The evaluation of the three themes that utilize sequential sampling (CO₂e estimates from plots, current tree canopy area, and historical tree canopy area) shall utilize separate worksheets and include a copy of the results within the verification report.

Where sequential measurements from the verifier result in a trend of agreement with the Project Operator's data, as defined by established tolerance bounds, verification can proceed toward a finding of adequate accuracy. The number of trees measured by the verifier is based on stopping rules established by the Reserve. Where a high level of agreement is found between the Project Operator and the verifier, a finding of accuracy may be established with the minimal number of trees required by the Reserve. As variation between verifier estimates and Project Operators increases, the number of trees measured by the verifier must increase in order to work toward establishing a finding of accuracy. In cases where continued verifier effort does not result in agreement, the Project Operator must decide whether continued investment in verification effort is justified. Alternatively, verification can be suspended while the Project Operator improves the quality of the inventory and revises related project documentation.

The worksheet provided by the Reserve includes the established stopping rules. Where agreement between the verifier and the Project Operator is within specified tolerance bounds, verification of plot data is successful. For the field-based verification activities, the verifier must randomly select an initial set of 40 individual trees sampled by the Project Operator, maintaining the order of their selection in sequential order (1 – 40).

Verification Element	Description	Verification Frequency
1	Measurement of Field Data: The verifier must develop an initial strategy to efficiently visit the first 20 trees (1-20) in the list. The trees do not need to be visited and measured sequentially, but they all need to be visited prior to entering the data in the sequential sampling works. The verifier must measure the individual trees and calculate the CO ₂ e associated with each tree. The entries of tree summaries into the sequential sampling worksheet provided by the Reserve must be in the same order the trees were randomly selected.	Initial verification and each subsequent 5-year onsite verification.
2	Data Quality Control: Confirm that the tree records used in producing the project-level estimate of CO ₂ e are in a database, have latitude and longitude for each tree, and that the sum of individual CO ₂ e estimates for each tree equals the reported value for the project.	Initial verification and each subsequent 5-year onsite verification.
3	Confirm that the confidence statistics for canopy cover were correctly calculated and meet minimum requirements.	Initial verification and each subsequent 5-year onsite verification.

9 Glossary of Terms

Additionality	GHG emission reductions should occur as a result of specific GHG mitigation incentives; additionality is achieved when GHG reductions are beyond what would occur under business as usual operation and result from activities that are not mandated by regulation.
Allometric Equation	An equation that utilizes the genotypical relationship among tree components to estimate characteristics of one tree component from another. Allometric equations allow the below ground root volume to be estimated using the above-ground bole volume.
Avoidable Reversal	An avoidable reversal is any reversal that is due to the project operator's negligence, gross negligence, or willful intent, including harvesting, development, and harm to the project area.
Baseline	An estimate of GHG emissions and removals that would have occurred in absence of the project under business as usual operations.
Best Management Practices	Management practices determined by a state or designated planning agency to be the most effective and practicable means (including technological, economic, and institutional considerations) of controlling point and nonpoint source pollutants at levels compatible with environmental quality goals. ¹⁹
Biological Emissions	For the purposes of the UTP Project Protocol, biological emissions are GHG emissions that are released directly from forest biomass, both live and dead, including forest soils. Biological emissions are deemed to occur when the reported tonnage of onsite carbon stocks, relative to baseline levels, declines from one year to the next.
Biomass	The amount of living matter comprising, in this case, a tree.
Bole	The trunk or main stem of a tree.
Buffer Pool	The buffer pool is a holding account for urban forest project CRTs administered by the Reserve. It is used as a general insurance mechanism against unavoidable reversals for all UTP projects registered with the Reserve.
Business As Usual	The activities, and associated GHG reductions and removals that would have occurred in the project area in the absence of incentives provided by a carbon offset market.

¹⁹ (Helms, 1998)

Entity	The individual, organization, agency or corporation that owns, controls, or manages urban trees.
Freshweight or Green Biomass	The weight of aboveground tree biomass when fresh (or green), which includes the moisture present at the time the tree was cut. The moisture content of green timber varies greatly among different species. The Reserve assumes that the moisture content of fresh weight biomass is 30%.
Global Warming Potential (GWP)	Factors used to convert emissions from GHGs other than carbon dioxide to their equivalent carbon dioxide emissions.
Greenhouse gas (GHG)	Greenhouse gases mean carbon dioxide (CO ₂), methane (CH ₄), nitrous oxide (N ₂ O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF ₆).
GHG Assessment Boundary	The GHG Assessment Boundary defines all the GHG sources, sinks, and reservoirs that must be accounted for in quantifying a project's GHG reductions and removals.
Inherent Uncertainty	The scientific uncertainty associated with calculating carbon stocks and greenhouse gas emissions.
KML	KML (Keyhole Markup Language) is an XML based file format used to display geographic data in an Earth browser such as Google Earth, Google Maps, and Google Maps for mobile.
Leakage	According to the Intergovernmental Panel on Climate Change: "the unanticipated decrease or increase in greenhouse gas benefits outside of the project's accounting boundary as a result of project activities."
Permanence	The requirement that GHGs must be permanently reduced or removed from the atmosphere to be credited as carbon offsets. For UTP projects, this requirement is met by ensuring that the carbon associated with credited GHG reductions and removals remains stored for at least 100 years.
Primary Effects	The project's intended changes in carbon stocks, GHG emissions or removals.
Professional Forester	A professional engaged in the science and profession of forestry. A professional forester is credentialed in jurisdictions that have professional forester licensing laws and regulations. Where a jurisdiction does not have a professional forester law or regulation then a professional forester is defined as having the certified forester credentials managed by the Society of American Foresters (see www.certifiedforester.org).
Project Activity	The carbon storage, emission reductions and emissions

	the atmosphere and transform it into biomass.
Start Date	See Project Commencement.
Tree	A woody perennial plant, typically large and with a well-defined stem or stems carrying a more or less definite crown with the capacity to attain a minimum diameter at breast height of five inches and a minimum height of 15 feet with no branches within three feet from the ground at maturity. ²⁰
Tree Residue	Aboveground biomass from urban trees (as distinguished from construction debris) that can be salvaged for reuse, such as mulch, wood products, or fuel for biomass power plant.
Unavoidable Reversal	An unavoidable reversal is any reversal not due to the project operator's negligence, gross negligence or willful intent, including windstorms or disease that are not the result of the project operator's negligence, gross negligence or willful intent.
Urban Area	The most recent Urbanized Area definition provided by the United States Census Bureau at http://www.census.gov/geo/maps-data/maps/2010ua.html .
Urban Forest Owner	A corporation, legally constituted entity (such as a utility), city, county, state agency, individual(s), or combination thereof that has legal control (e.g. right to plant or remove, etc.) of any amount of urban forest carbon within the project area.
Urban Tree Planting Project (UTP Project, project)	<p>A planned set of activities designed to increase removals of CO₂ from the atmosphere, or reduce or prevent emissions of CO₂ to the atmosphere, through increasing and/or conserving urban forest carbon stocks.</p> <p>An urban tree planting (UTP) project involves new trees being planted in areas where trees have not been harvested with a primary commercial interest over the past 10 years prior to project commencement. This does not include harvesting where the primary concern is for human safety or forest health. Only planted trees and trees that regenerate from planted trees are eligible to be quantified for credits. Benefits from urban tree planting activities occur when the CO₂e associated with planted trees exceeds baseline tree planting CO₂e levels.</p>
Verification	The process of reviewing and assessing all of a project's reported data and information by an ISO-accredited and Reserve-approved verification body, to confirm that the project operator has adhered to the requirements of this protocol.

²⁰ (Helms 1998)